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BEACH AND NEARSHORE PLACEMENT OF MATERIAL DREDGED FROM FEDERALLY AUTHORIZED NAVIGATION PROJECTS

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This report has examined four aspects of the use of dredged material by the Corps of Engineers for the purposes of beach nourishment and/or eroision control. These were: (a) the policies and authorities used in the placement of dredged material; (b) factors which affect the feasibility of dredged material placement; (c) the extent to which the Corps is currently utilizing dredged material for beach nourishment and/or erosion control; and (d) procedures used to exploit or promote such uses of dredged material. The basic findings of the study are summarized in the report.

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PREFACE

This report presents a study of various aspects of the beneficial use of sedimentary material, dredged from Federal navigation projects, for the purpose of nourishing beaches or applied otherwise in providing salutary effects on shore erosion problems in the Coastal and Great Lakes regions. Demands in those areas for this particular beneficial use of dredged material will intensify over time given the prevalence of shore erosion problems, increasing population pressures and beach use, and the diminishing availability of upland and estuarial disposal areas for dredged material.

The report was prepared by Lim Vallianos under the supervision of Kyle Schilling, Chief, Policy Studies Division, U.S. Army Engineer Institute for Water Resources in coordination with the study technical monitor, Donald Barnes, Policy and Planning Division, Office of the Chief of Engineers.

EXECUTIVE SUMMARY

The study reported herein has examined four aspects of the use of dredged material by the Corps of Engineers for the purposes of beach nourishment and/or erosion control. These were: (a) the policies and authorities used in the placement of dredged material; (b) factors which affect the feasibility of dredged material placement; (c) the extent to which the Corps is currently utilizing dredged material for beach nourishment and/or erosion control; and (d) procedures used to exploit or promote such uses of dredged material. The basic findings of the study are summarized below.

FINDINGS

a. Authorities and Policies. In 1968, the Corps established an organizational policy to beneficially use dredged material for various purposes including beach nourishment and/or erosion control. This policy has been broadly applied in the provision of beach fills in those cases where the placement operations have been clearly the least costly disposal alternatives.

To enhance further use of dredged material for beach fill purposes, the Congress provided discretionary authority to place material for such purposes under Section 145, WRDA 1976, as amended by Section 933, WRDA 1986. Currently, this authority and related regulations allow Federal participation in 50 percent of the added costs of dredged material placement for beach nourishment purposes providing the placement is economically justified and other conditions, common to public works projects, are met. Where all of these conditions cannot be met, placement can still be accomplished if non-Federal interests provide all of the added costs, and the placement is environmentally acceptable and in the public interest. Additionally, there are as many as 7 other authorities identified in this report which can be applied to use dredged material for beach nourishment purposes. These authorities cover most, if not all, project circumstances likely to arise. Accordingly, there is no evident need for added authorities in connection with the use of dredged material for beach nourishment applications.

Beach nourishment activities under all Corps of Engineers authorities are constrained by the Administration's current budgetary policy which precludes the use of Army Civil Works budgetary resources for recreation-oriented projects. Beach nourishment must be primarily for the purpose of hurricane and storm damage reduction to receive Administration support, except where beach placement is the least costly disposal alternative. Opportunities for beach nourishment projects

may be further impacted by continuing budgetary pressures on the operations and maintenance (O&M) activities of the Corps of Engineers. In this period of large Federal budget deficits, all projects must compete for limited funds. Efforts to intensively manage O&M activities may result in the deferral of O&M work, reductions in project dimensions, or other actions that adversely impact the timing and availability of materials for beach nourishment.

b. Factors affecting Use of Material. Many beach nourishment applications of dredged material are accomplished with no operational difficulty and without added cost or other significant constraints. However, these simple and least cost opportunities to beneficially use dredged material are very limited in terms of the yearly number of dredging operations and related dredged material quantities. For example, during the period 1986-1988 only 4.9 percent of all the material dredged from Federally authorized channels and harbor basins in the Coastal and Great Lakes regions was placed for beach nourishment and/or erosion control purposes. The factors which affect this use of dredged material and in many cases preclude or severely limit nourishment applications are: (a) environmental constraints which may relate to contaminated sediments, fine sediments which are primarily silts and clays, the presence of important habitats, and time periods of biological significance; (b) equipment constraints which pertain to the basic dredging equipment being employed and related limitations to accomplish the desired placement operation from a functional standpoint or in a cost-efficient manner; (c) dredged material factors which include the physical characteristics of the material in terms of engineering quality for nourishment purposes, volume of material available for nourishment and the location of material excavation relative to the desired nourishment site; and (d) institutional constraints which include the ownership and use of the beach area to be nourished, the economic feasibility of the nourishment operation, the availability of funds for defraying the added costs of nourishment, the provision of lands, easements, rights-of-way and relocations required for a placement operation, and the designation of the specific material placement areas. Of all the factors mentioned above, the two which place the greatest constraints on the use of dredged material for beach nourishment and erosion control are that most dredging operations are performed too far from beach areas, and the grain size characteristics of the material are too fine (silts and clays) for nourishment applications.

c. Extent of Dredged Material Use. The investigation reported herein examined 348 navigation projects in the sample period 1986-1988. These projects were grouped into 3 categories; namely: (a) new projects being planned, designed or under construction; (b) existing projects being maintained; and (c) existing projects being studied to determine the feasibility of beach nourishment placements under Section 933, WRDA 1986. In this sample period, 152 projects or

44 percent of the projects, involved planned or actual applications of dredged material for beach nourishment or erosion control uses. The extent of that particular use of dredged material, in this recent time period, represents a significant increase in nourishment/erosion control applications when compared to similar statistics for an earlier period, viz. 1978-1980. In the earlier period, 211 navigation projects were investigated of which 52 projects or 25 percent involved planned or actual nourishment uses of dredged material. Several other major differences were evident in the comparison of the 1987-1980 and 1986-1988 data. First, the 1986-1988 data revealed that the preponderant number, 81 percent, of the recent nourishment operations involved direct beach fill placement as compared to an approximately equal number of direct beach fill and nearshore profile nourishment applications in the earlier 1978-1980 period. Second, there has been a significant increase in the number of dredged material applications involving cost sharing with non-Federal interests. Specifically, during the 1978-1980 period, only 17 percent of the actual or planned nourishment applications of dredged material were cost-shared with non-Federal sponsors, whereas 44 percent were found to involve cost-sharing in the 1986-1988 period. In summary, the data collected for this investigation indicate that Corps of Engineers district and division offices are keenly aware of the values of dredged material for nourishment purposes and are broadly applying dredged material for such purposes within the limits of Corps authority and available funds. This is not only evident in the increased numbers of standard applications of dredged material placed directly as beach fills, but by new and promising initiatives being taken to place dredged material in offshore mounds to serve as wave energy attenuation features. However, there is an apparent need for Corps field offices to improve coordination procedures with state agencies as regards potential uses of dredged material for beach nourishment purposes under authority of Section 933, WRDA 1986.

d. Procedures to Promote Use of Material Under Section 933. With the exception of the Jacksonville and Mobile Districts, the Corps' field offices usually coordinate Section 933 activities on informal and ad hoc bases with the respective state agencies. This general absence of a systematized and routine coordination and information exchange procedure between the Corps and state governments diminishes possibilities for maximizing the subject use of dredged material. Moreover, it can hinder a timely and expeditious use of the material when needs arise because of delays that result from a lack of advanced planning. In terms of a national programmatic perspective, there is no synthesized data set within the Civil Works Information System as concerns beneficial uses of dredged material. This renders program or policy oversight difficult and obviates the possibility of advanced analysis and planning for budgetary needs and justifications.

CONCLUSIONS

The following conclusions are reached in accordance with the findings enumerated above.

- The Corps of Engineers has sufficient legislative authorities and organizational policy to allow its field operating activities to adequately use dredged material for purposes of beach nourishment and erosion control under most, if not all, circumstances likely to arise.

- Of the total quantity of material dredged by the Corps in the coastal and Great Lakes regions, approximately five (5) percent is placed for beach nourishment or erosion control purposes. Though future needs for beach nourishment will cause this value to increase, the proportion of material volume used for purposes of nourishment will remain relatively small in comparison to the total national dredging quantity due to a number of constraints. Principle among these is that most of the dredged material is excavated from interior channels and harbors where the material is characteristically fine in texture as well as being far removed from most beach areas. In addition, there are other constraints to material utilization including environmental concerns, equipment/operational limitations, and institutional factors which may involve budgetary limitations, economic justification and phasing of Federal and non-Federal funds.

- The Corps' utilization of dredged material for beach nourishment or erosion control purposes has markedly increased over the past decade as evidenced by a comparison of relevant data from the late 70s and late 80s. The number of navigation projects for which there was a planned or actual subject use of dredged material increased from 25 percent in the earlier period to 44 percent in the later period. In the later period, increased standard nourishment applications were also accompanied by new initiatives to place dredged material in offshore mounds that serve as storm wave-energy filters and/or future sources of beach fill. This record demonstrates a strong commitment on the part of the Corps to utilize dredged material for the subject purpose whenever such beneficial use is practicable.

- Apart from circumstances in which dredged material is placed on beaches as a least cost or equivalent least cost disposal alternative, the most expedient means by which the Corps can effect such placement of material is under authority of Section 933, WRDA 1986. Accordingly, every reasonable effort should be made by the Corps to encourage states to use this authority to meet current and future needs for beach nourishment to the fullest practicable extent. Toward that end, all Corps field operating activities should establish

formalized information exchange and coordinating procedures with state governments along lines similar to those currently in use by the Jacksonville and Mobile Districts in the coordination of Section 933 activities with the State of Florida, as described in this report.

- In the interest of continuity and consistency, a single organizational unit in each Corps operating activity should be assigned the responsibility of coordinating Section 933 activities with state governments on an annual basis. These activities should be viewed as part of the life-cycle management of navigation dredging projects.

- The annual Section 933 coordination information and responses of state agencies should be maintained in the Civil Works Directorate information system for purposes of national oversight and for planning and justification of Corps budgetary requests. The headquarters data bank should also embody information on all other beneficial uses of dredged material being applied through the Corps dredging mission.

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I. INTRODUCTION

GENERAL

The Corps of Engineers has an established policy to beneficially and productively use dredged material in the course of constructing and maintaining Federally authorized navigation projects. This policy has been implemented over a broad horizon of uses such as landfills for industrial, commercial, residential and recreational purposes; construction of highway embankments; enhancement of natural habitats such as the development of wetlands, waterfowl nesting areas and shellfish beds; construction of flood protection levees; and the placement of dredged material on beaches and in nearshore areas as a means of preventing or ameliorating problems of shore erosion and storm attendant damages. The latter of these beneficial uses, as applied in the Coastal zone and Great Lakes regions, constitutes the subject matter of this report. Specifically, the report contains:

- A synthesis of authorities and policies under which the Corps of Engineers can implement beach and nearshore placement of material dredged from authorized navigation projects;

- A description of factors affecting the feasibility of using dredged material for beach nourishment and erosion control purposes;

- A documentation of the extent to which the Corps is currently applying dredged material to nourish beaches adjacent or proximate to navigation projects;

and

- An evaluation of the procedures used by the Corps to exploit or promote opportunities to use dredged material for beach nourishment purposes.

PURPOSE OF REPORT

The study reported herein was requested by the Policy and Planning Division, Directorate of Civil Works as a result of recent Congressional interest regarding the extent to which the Corps uses dredged material from navigation projects to nourish adjacent beaches, and to explore the question of whether additional authorization is needed by the Corps to increase such uses of dredged material.

This report addresses those specific points of interest and in addition, serves the general purpose of continuing a corporate emphasis on the promotion of beneficial use of dredged material.

CORPS DREDGING ACTIVITIES

The U.S. Army Corps of Engineers Directorate of Civil Works is involved in virtually every navigation dredging operation performed in the United States through direct project involvement or in the exercise of its regulatory responsibilities. In total, the Corps' dredging mission entails maintenance and facilities improvement along sections of a 25,000-mile network of commercially navigable channels serving some 400 ports, including 130 of the Nation's 150 largest cities. The connecting waterways to these ports and harbors carry about 2 billion tons of commerce each year, as water-borne transport continues to be the most cost and energy-efficient means of shipping bulk cargoes such as coal, grains, petroleum products, chemicals, ores, and finished metal products. The significance of this commerce to the economic prosperity of the U.S. is reflected by statistics which indicate that 20 percent of all jobs in this country depend in some way on water-borne commerce. In addition, the waterways network constitutes an infrastructure component which is vital to the Nation's defense capabilities.

To accomplish its task of maintaining and operating the Nation's existing navigation system, the Corps of Engineers dredges about 275 million cubic yards of sedimentary material each year at a current annual expenditure level of approximately $360 million, see Table 1. Further, recently authorized improvements to the waterways and harbors of the U.S. call for capital improvement dredging by the Corps, over the next 10-year period, that will demand a potential average annual expenditure of about $200 million in the yearly removal of approximately 70 million cubic yards of material. Also, the Corps is directly involved in supporting the U.S. Navy's dredging programs in both maintenance and new work improvements to naval facilities.

In conducting these dredging activities, planning and implementing the disposal of the excavated material is often fraught with costly and problematic conditions associated with environmental constraints, and a rapidly declining availability of upland material disposal sites. These costly and constraining influences on both upland and open water disposal of dredged material have progressively intensified over the past three decades and will continue to do so. This situation presents mounting challenges to the Corps to exploit every opportunity to beneficially use dredged material in performing its mission to construct, expand and maintain navigation projects.

TABLE 1

CORPS OF ENGINEERS CIVIL WORKS
DREDGING QUANTITIES AND EXPENDITURES
1980 THROUGH 1988

	MAINTENANCE DREDGING		NEW WORK DREDGING		TOTAL	
FISCAL YEAR	VOLUME OF MATERIAL (MILLIONS OF CUBIC YARDS)	EXPENDITURES ($ MILLION)	VOLUME OF MATERIAL (MILLIONS) OF CUBIC YARDS)	EXPENDITURES ($ MILLION)	VOLUME OF MATERIAL (MILLIONS) OF CUBIC YARDS)	EXPENDITURES ($ MILLION)
1980	243	306	53	98	296	404
1981	262	344	97	115	359	459
1982	217	311	55	135	272	446
1983	254	355	32	89	286	444
1984	294	455	52	94	346	549
1985	272	384	30	63	302	447
1986	382	322	33	64	415	386
1987	308	388	73	215	381	603
1988	260	380	90	240	350	620
TOTAL	2,492	3,245	515	1,113	3,007	4,358
ANNUAL AVERAGE	277	361	57	124	334	484

FUTURE DEMAND

With respect to the nourishment of beaches with material removed from navigation projects, it can be expected that demand for such use of that material will continue as a result of both physical conditions and demographic patterns. On the physical side, shore erosion problems in many areas are expected to be exacerbated by an increased rate of rise in worldwide sea level that has been predicted through the turn of the next century due to a projected global warning trend[1][1]. Concurrently, increased use of beaches and immediate upland areas, attendant with burgeoning population growth in geographic bands bordering on the nation's coastlines, will exert ever increasing pressures to address shore erosion problems. In that connection, population growth within and near the coastal zone has been so high in the past decade that there are estimates predicting that about 80 percent of the U.S. population will reside within an hour drive of an ocean by the year 2000[2].

[1]See references.

II. LEGISLATIVE AUTHORITIES AND POLICIES

DISCRETIONARY AUTHORITY CONCERNING DREDGED MATERIAL

The Water Resources Development Act (WRDA) of 1976, Public Law (PL) 94-587, enacted October 22, 1976 contains the first congressional authorization specifically providing the Secretary of the Army with discretionary authority to use dredged material for beach nourishment purposes, although the Secretary's use of that authority was conditioned on several requirements; namely, a State must request the work, it must be in the public interest, and non-Federal interests must pay the added costs for beach placement. A complete reading of Section 145 of PL 94-587 is as follows:

> The Secretary of the Army, acting through the Chief of Engineers, is authorized upon request of the State, to place on the beaches of such State beach-quality sand which has been dredged in constructing and maintaining navigation inlets and channels adjacent to such beaches, if the Secretary deems such action to be in the public interest and upon payment of the increased cost thereof above the cost required for alternative methods of disposing of such sand.

Policies adopted by the Corps of Engineers for implementing the placement of dredged material on beaches are covered in the following section of this report. It will suffice to mention at this point, that the Corps had adopted a policy to use dredged material for beneficial purposes, including beach nourishment, as early as October 31, 1968 or eight years prior to enactment of P.L. 94-587 and the pertinent authority under Section 145. The only apparent difference between the 1968 Corps policy and Section 145 is that the former allowed for response to requests for the beneficial application of dredged material and payment of additional costs by any "local interests," whereas Section 145 provided authorization "upon request of the State." This notwithstanding, Section 145 served essentially to codify in law, an institutional policy and practice which had already been in effect for a considerable period of time.

The authority for use of dredged material for beach nourishment under Section 145, P.L. 94-587 was modified by Section 933 of the WRDA of 1986, P.L. 99-662, enacted November 17, 1986. This modification provided for Federal cost sharing in the incremental or added costs of placing dredged material on beaches. Section 933 is very brief as shown below.

> SEC.933. COST SHARING FOR DISPOSAL OF MATERIAL ON BEACHES. Section 145 of the Water Resources Development Act of 1976 (33 U.S.C. 426j) is amended by inserting "by such State of 50 percent" after "upon payment."

The legislative history pertaining to Section 933, WRDA 1986 is contained in the Joint Explanatory Statement of the Committee of Conference which reads as follows:

Dredged Material Placement

Section 145 of the Water Resources Development Act of 1976 authorizes the Secretary to place clean, suitable dredged material from navigation projects on beaches for the purpose of beach restoration and beach erosion control if the State agrees to pay the additional costs associated with depositing the material on the beach as opposed to depositing it in the planned disposal area.

Section 933 of the Conference substitute amends Section 145 to provide that the non-Federal share shall be 50 percent of the additional cost rather than 100 percent. This is appropriate in view of the fact that existing law provides for 50 percent Federal cost sharing for the protection of public beaches.

The Secretary and the states should take advantage of this section.

Further modification of Section 145, WRDA 1976 was made by Section 35, P.L. 100-676, WRDA 1988 enacted November 17, 1988. Section 35 requires consideration of a state's schedule for providing its share of funds for placing sand on beaches, and accommodation of such schedule to the maximum extent practicable.

It should be noted that the authority provided by Section 145 of P.L. 94-587, as amended, is unlike those which authorize Army Civil Works projects, in that this authority allows the Secretary to participate in what is basically a non-Federal project.

ARMY CIVIL WORKS PROJECT AUTHORIZATIONS

Dredged material can be used for beach nourishment as an integral part of an Army Civil Works project which has been implemented under authorities other than those cited above. In that circumstance, any added costs associated with placement of the dredged material would be shared with the sponsor of the project in accordance with the related local cooperation requirements. Two broad categories of projects are possible under this arrangement; i.e., those specifically authorized by Congress and those constructed under the so-called Continuing Authorities Program, also referred to as the Small Projects Program. The latter is comprised of authorities given by the Congress to the Secretary of the Army, acting through the Chief of Engineers, to investigate and construct certain types of small projects. Accordingly, there are a number of authorities which provide a broad base of alternatives to beneficially use dredged material for the nourishment of beaches when placement of the materials does not constitute the least costly and approved dredged material disposal, or the material is not placed under the authority of Section 145, WRDA 1976 as amended. These alternative authorities and possibilities are enumerated below.

Projects Specifically Authorized by Congress

- New or modified navigation projects in which the dredged material placement could, if warranted, be a separable feature intended to prevent or mitigate expected project-induced erosion effects.

- Shore protection projects in which the dredged material placement could constitute, in part or totally, beach nourishment requirements when beach nourishment is a project feature.

Continuing Authority Projects

- As in the case of Congressionally authorized navigation projects, dredged material placement could be used, if warranted, as a separable erosion mitigation feature in a small navigation project constructed under Section 107, River and Harbor Act (RHA) 1960, as amended by Section 133, WRDA 1976.

- If an existing Federal navigation project is identified as the causal factor of a quantifiable degree of erosion and attendant damage along an adjacent shore, placement of dredged material could be used as a corrective measure under authority of Section 111, RHA 1968, as amended by Section 940, WRDA 1986.

- Dredged material could be used to serve, in part or totally, the requirements of shore protection being provided by a small beach erosion control projects authorized under Section 103, RHA 1962 or an emergency project to protect public facilities from shore erosion under Section 14, Flood Control Act (FCA) 1946.

Additionally, dredged material could be used for emergency protection or repair of Federally authorized and constructed hurricane and shore protection projects. Authority for such use of dredged material is provided by P.L. 84-99, enacted 28 June 1955, as amended by Section 82, WRDA 1974.

CORPS OF ENGINEERS POLICY

The Corps' institutional position concerning productive uses of dredged material was promulgated by Regulation (ER) No. 1130-2-307, entitled, "Project Operation, Dredging Policies and Practices," dated 31 October 1968. Reference to beneficial uses of dredged material is contained in paragraph 11 of ER 1130-2-307 which states:

> It is the policy to secure the maximum practicable benefits through the utilization of materials dredged from authorized navigation channels and harbors, provided extra cost to the Government is not incurred. Such use of dredged materials will include nourishment of beaches, erosion control of river banks, and land reclamation. If it is evident during the initial planning of dredging operations that additional costs would be incurred, local interests will be given reasonable opportunity to finance the additional costs. In the utilization of sand for beach nourishment, the technical advice of the Coastal Engineering Research Board will be obtained in determining the beaches most urgently in need of replenishment.

Many changes have occurred, since 1968, in the practice of dredging and in dredging project management; therefore, ER 1130-2-307 is currently being revised to reflect those changes. As regards dredged material placement for beach nourishment, Section 933, WRDA 1986 allows for Federal cost sharing with respect to added costs associated with that particular beneficial use of dredged material. Hence, extra cost to the Government can be incurred with such use of dredged material and the revised dredging regulation will cover that policy point. The details of Corps policies addressing nourishment of beaches, by all applicable shore protection authorities, are explicated in Regulation (ER) No. 1165-2-130, entitled, "Federal Participation in Shore Protection," dated 15 June 1989.

With respect to the execution of legislative authority provided by Section 933, WRDA 1986, ER 1165-2-130 contains the following guidance.

> It is Corps policy to accomplish construction and maintenance dredging in the least costly and most environmentally sound manner possible (ER 1130-2-307). If placement of dredged material on a beach or beaches is determined by the Corps to be the least costly acceptable means for disposal of the material, then such placement should be considered integral to accomplishment of the project work and not subject to any special non-Federal cost sharing requirements (unless benefits from the on-beach placement are required for project justification and those benefits are of a kind with which special cost sharing is associated).
>
> It is Corps policy to participate in the additional costs for placing beach-quality sand or other suitable material, dredged by the Corps during construction or maintenance of Federal navigation projects, onto adjacent beaches or near shore waters subject to the following:
>
> (a) Placement of the material on a beach or beaches and Federal (Corps) participation in the costs must be requested by the State in which the beach or beaches are located;
>
> (b) The added cost of disposal must be justified by the benefits associated with the protection of such beach or beaches;

(c) The storm damage reduction benefits resulting from the beach protection must exceed 50 percent of the total benefits, unless the placing of dredged material is economically justified based on storm damage reduction benefits alone, or on the combination of storm damage reduction benefits and an equivalent amount of incidental recreation benefits if incidental recreation benefits exceed 50 percent of total benefits.

(d) The beaches involved must be open to the public;

(e) the placement must be environmentally acceptable, pursuant to all applicable statutes and regulations;

(f) Local interests must pay 50 percent of the added cost of disposal above the alternative least costly method of disposal; and

(g) Local interests must provide (without cost sharing) any necessary additional lands, easements, rights-of-way, and relocations.

Should all of the foregoing conditions not pertain, it is Corps policy to place beach-quality sand or other suitable material, dredged by the Corps during construction and maintenance of Federal navigation projects, onto beaches or nearshore waters, even though more costly than alternative means of disposal, subject to the following:

(a) Placement on a beach or beaches must be requested by the State in which the beach or beaches is located;

(b) A finding can be made that, regardless of evaluated benefits, protection of the beaches involved is in the public interest;

(c) The placement must be environmentally acceptable, pursuant to all applicable statutes and regulations;

(d) Local interests must pay 100 percent of the added cost of disposal above the alternative least costly method of disposal; and

(e) Local interests must provide any necessary additional lands, easements, rights-of-way, and relocations.

Apart from its specific dredging policy, the Corps' basic planning procedures and policies implicitly call for or foster consideration of the use of dredged material for beach nourishment purposes in appropriate circumstances. Briefly, these policies require the evaluation of a full range of alternative solutions to water resource problems from the outset of Corps planning activities. As shown above, there are differing circumstances and related authorities under which dredged material could be used to nourish beaches. However, notwithstanding the singularity of purpose for this productive use of dredged material, there are marked differences, case by case, in the Federal/non-Federal cost sharing requirements associated with material placement. These requirements are dictated by the particular legislative authorities under which

the dredged material is placed as beach nourishment. A general coverage of cost sharing policies in accordance with project circumstances and authorities is presented below.

NAVIGATION PROJECTS

BASIC TYPES OF PROJECTS: Navigation projects specifically authorized by Congress or small navigation projects implemented under continuing authority provided by Section 107, RHA 1960, as amended by Section 133, WRDA 1976.

CONDITION 1: Beach or nearshore placement of dredged material is the least costly dredged material disposal in accordance with dredging policies.

COST SHARING:

Federal Portion of Additional Costs--None.

Non-Federal Portion of Additional Costs--None.

CONDITION 2: A state requests dredged material placement for beach nourishment purposes as an alternative to least costly disposal method in accordance with authority of Section 145, WRDA 1976, as amended by Section 933, WRDA 1986.

COST SHARING:

Federal Portion of Additional Costs--50%, if the conditions for Federal participation are met.

Non-Federal Portion of Additional Costs--50%, if the conditions for Federal participation are met; 100% when conditions for Federal participation are not met, if placement is in the public interest and environmentally acceptable.

CONDITION 3: Dredged material placement for beach nourishment is a separable navigation project feature intended to prevent or mitigate anticipated project-induced beach erosion as provided by the basic project authorization (Congressional or Continuing Authority).

COST SHARING:

Federal and non-Federal portion of project's dredged material placement feature--varies. Non-Federal interests share in the construction costs in the same proportion as the cost sharing provisions applicable to the navigation project causing or projected to cause damage, and pay all operations and maintenance costs.

COMMENTS: Commercial navigation projects authorized by Congress or under the continuing authority provided by Section 107, RHA 1960 as amended, are cost shared in accordance with Section 101, WRDA 1986. For commercial projects, the non-Federal contributions vary from 20 to 60 percent depending on depth. Any portion of a project formulated to carry recreational navigation benefits requires a 50 percent non-Federal contribution.

CONDITION 4: Placement of dredged material from an existing Federal navigation project is implemented as a means of mitigating a quantifiable amount of shore erosion directly attributable to the operation of the navigation project under continuing authority provided by Section 111, RHA 1968, as amended by Section 940, WRDA 1986.

COST SHARING:

Federal Portion of Placement Costs--40% to 100%.

Non-Federal Portion of Placement Costs--0% to 60%.

COMMENTS: Placement costs are shared in the same proportion as the cost sharing provisions applicable to the navigation project causing shore erosion. Non-Federal interests must operate and maintain such measures.

SHORE PROTECTION PROJECTS

BASIC TYPES OF PROJECTS: Hurricane and shore protection projects specifically authorized by Congress or small shore protection projects implemented under the Continuing authority program.

CONDITION 1: Dredged material is used to fulfill, in part or totally, the beach nourishment requirements of a hurricane and storm damage reduction project authorized by Congress or the Continuing Authority provided by Section 103, RHA 1967, as amended RHFCA 1970 and Section 915, WRDA 1986.

COST SHARING:

Federal Portion of Additional Costs--65%.

Non-Federal Portion of Additional Costs--35%.

COMMENTS: Cost assignment may differ from this general formula based on the mix of shore ownership and benefit categories. For example, the costs for Federally owned shores are 100% Federal, the costs for privately owned undeveloped shores are 100% non-Federal, and the costs assigned to non-Federal public shores are generally shared 50/50.

CONDITION 2: Dredged material is used to fulfill, in part or totally, beach nourishment requirements of emergency measures taken to prevent erosion and attendant flood damages to public works or non-profit public services facilities under Continuing Authority provided by Section 14, FCA 1946 as amended by Section 27, WRDA 1974 and Section 915, WRDA 1986. Federal participation is limited to projects up to $500,000.

COST SHARING:

Federal Portion of Placement Costs--75%.

Non-Federal Portion of Placement Costs--25%.

CONDITION 3: Dredged material is used to fulfill, in part or totally, beach nourishment requirements of emergency measures taken to protect a threatened hurricane and shore protection project or to repair such a project after damage by an unusual event under authority provided by P.L. 84-99, enacted 28 June 1955, amended by Section 82, WRDA 1974.

COST SHARING:

Federal Share of Placement Costs--100%.

Non-Federal Share of Placement Costs--None.

The cost sharing information presented above is summarized in Table 2. Clearly, there are numerous authorities available for application in the use of dredged material for beach nourishment purposes. Moreover, these authorities cover most, if not all, project circumstances likely to arise as a practical matter.

TABLE 2

FEDERAL/NON-FEDERAL COST SHARING IN THE PLACEMENT OF DREDGED MATERIAL FOR BEACH NOURISHMENT PURPOSES

TYPE OF PROJECT	PROJECT STATUS	PROJECT PLACEMENT CONDITIONS	AUTHORITY	RANGE OF COST SHARING FOR DREDGED MATERIAL PLACEMENT	
				FEDERAL (%)	NON-FEDERAL (%)
NAVIGATION					
	New, Modified or Existing	Least Costly Dredged Material Disposal	Corps Policy	0	0
	New, Modified or Existing	A State Requests Placement	Section 145 WRDA 1976 As Amended	0 or 50[1]	50 or 100[1]
	New, or Modified or Existing	Separable Erosion Prevtion or Mitigation Feature	Project Authorization or Section 111 RHA 1968 As Amended	40 to 80[2]	20 to 60[2]
SHORE PROTECTION					
	New or Modified	Part or Total Nourishment Requirement	Part of Project Congressional Authorization or Section 103	65[3]	35[3]
	New	Emergency to Protect Public Facilities	Section 14 FCA 1946 As Amended	75	25
	Existing	Emergency to Protect Existing Project	P.L. 84-99 As Amended	100	0

1 If Federal conditions are met, costs are shared 50/50. If Federal conditions are not met, costs are 100% non-Federal.

2 Percentages shown apply to new or modified navigation projects. Costs to mitigate existing projects are shared in the same proportion as the costs were shared for the navigation project.

3 Percentages may vary depending on shore ownership and benefit categories.

III. FACTORS AFFECTING USE OF DREDGED MATERIAL

GENERAL

The concept of using dredged material for beach or nearshore profile nourishment is a simple one, and in many cases, decisions to apply dredged material for that purpose can be arrived at quickly and implemented with ease. Usually, the conditions favorable to expeditious use are: (a) the physical and chemical characteristics of the material and intended timing of the placement operation are acceptable in terms of environmental considerations; (b) the material is to be dredged from an area where the source of material is readily identifiable as the beach area or where the material is similar to that found in the beach area; (c) the employed dredging equipment is capable of accomplishing the intended placement without significant change in operational techniques or equipment requirements; (d) the beach or nearshore placement does not entail additional costs or non-Federal cost sharing; i.e., the placement operation constitutes the least costly disposal alternative; and (e) the dredging operation is relatively close to the desired placement area. Such favorable conditions do not generally exist in terms of the total number of dredging operations conducted each year and the related quantities of dredged material. This is evident on considering that over the past 5-year period, only 4.5 percent of the total quantity of material dredged from Federally authorized navigation channels in the Coastal and Great Lakes regions was used for beach or nearshore profile nourishment. Obviously, there are major constraints to this beneficial use of dredged material. The factors affecting the subject use are discussed below, but it can be said at the outset that the major factors limiting the amount of material that can be used are that the preponderant number of dredging operations are far removed from beach areas and/or the grain-size characteristics of the material are too fine for nourishment applications.

ENVIRONMENTAL FACTORS

Material placed on beaches and in the nearshore zone must be safe with respect to human health and the ecological communities within the influence range of the placement zone. Approximately 3 percent of the material dredged each year in the U.S. contains toxic substances and accordingly, is disposed of in confined sites or in open waters where it is capped with clean and stable material. As regards the major portion (97 percent) of dredged material, the most important water quality consideration is the fraction of available material characterized as fine-grain, i.e., the portion consisting of silts and clays which remain in suspension for a considerable period after disposal. Even if a particular mass of dredged material contains a substantial amount of suitable coarse, sandy material, the fine-grain fraction may be large enough to produce turbidity levels which would be injurious to aquatic life and habitats and/or unacceptable from an aesthetic viewpoint. Under certain conditions,

silt/clay fractions of only 10 to 12 percent of the total material volume can prevent use or dredged material for purposes of beach fill. In most cases, particularly those involving maintenance dredging, it is not functionally or economically feasible to separate the course and fine-grain fractions of the dredged material.

A number of other environmental factors may also control or limit the use of dredged material which would otherwise be suitable. Principal among these are: (a) covering of live coral reefs, seagrass or shellfish beds is usually unacceptable; and (b) placement operations must normally avoid periods of the year during which the biological productivity within the placement zones is high or when certain animals such as turtles or birds occupy these areas in the course of their annual life-cycle. Therefore, acceptable time-windows for use of dredged material can be very narrow in some cases and incompatible with the exigencies of dredging operations directed at maintaining safe and unobstructed vessel passage.

MATERIAL FACTORS

Material factors can be classed as textural, volumetric and locational. These factors have significant functional and benefit/cost implications. The textural aspects pertain to the composite grain-size distribution characterizing the dredged material and the related physical compatibility of the material with the hydrodynamic regime of the placement zone. Reference was made to the undesirability of fine-grain material (silts and clays) for beach/nearshore placement as concerns environmental factors. Though there are areas in which "mud beaches" are found, rarely if ever are such beaches placed or nourished with fine-grain sediments unless the basic purpose is to create or enlarge a wetland habitat. In any case, and environmental factors aside, fine-grain silt/clay sediment deposits would have extremely short-lived value in most sandy beach environments. This is also true in most cases for fine sand except where nearshore placement of such material is used to nourish the seaward and deeper portions of the active beach profiles where fine sand is normally found to reside. Admittedly, if a beach per se is the least costly dredged material disposal option and there are no environmental constraints, placement of fine sand directly on the beach is an acceptable practice.

The usual benchmark of the functional value of dredged material as beach fill is the composite grain-size distribution of the recipient beach material. If the dredged material is identical with that characterizing the recipient beach, it will respond to littoral processes essentially in the same way as does the beach. For example, if the beach has been eroding at a certain rate, a dredged material fill having the beach sand characteristics would also experience about the same rate of erosion loss. On the other hand, dredged material coarser than the beach would be more resistant to erosive forces and

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last longer, while finer material would be lost at a higher rate than the native beach material. Though this gives a highly simplified portrayal of the behavior of sandy material placed for the purposes of beach fill, these generalities are basically valid. The salient point is that the physical characteristics of dredged material in relation to those of the beach become increasingly important as the added costs for placement increase. In some cases, better returns on the same investment can be achieved by using another source of material for beach fill. However, under such circumstances, other beach erosion control authorities would have to be applicable to the site in order to justify Federal participation in the use of another source of material.

The volume of suitable dredged material is sometimes a factor influencing its use or frequency of use as beach fill, particularly with respect to maintenance operations. In certain instances the volume of dredged material is too small to provide significant functional or economic values. Where these circumstances exist, it may be possible in some cases to store the dredged material for eventual nourishment purposes when an adequate supply has accumulated. The material can be stored in existing confined disposal areas when pipeline dredges are used or in offshore mounds when hopper dredges or disposal barges are involved.

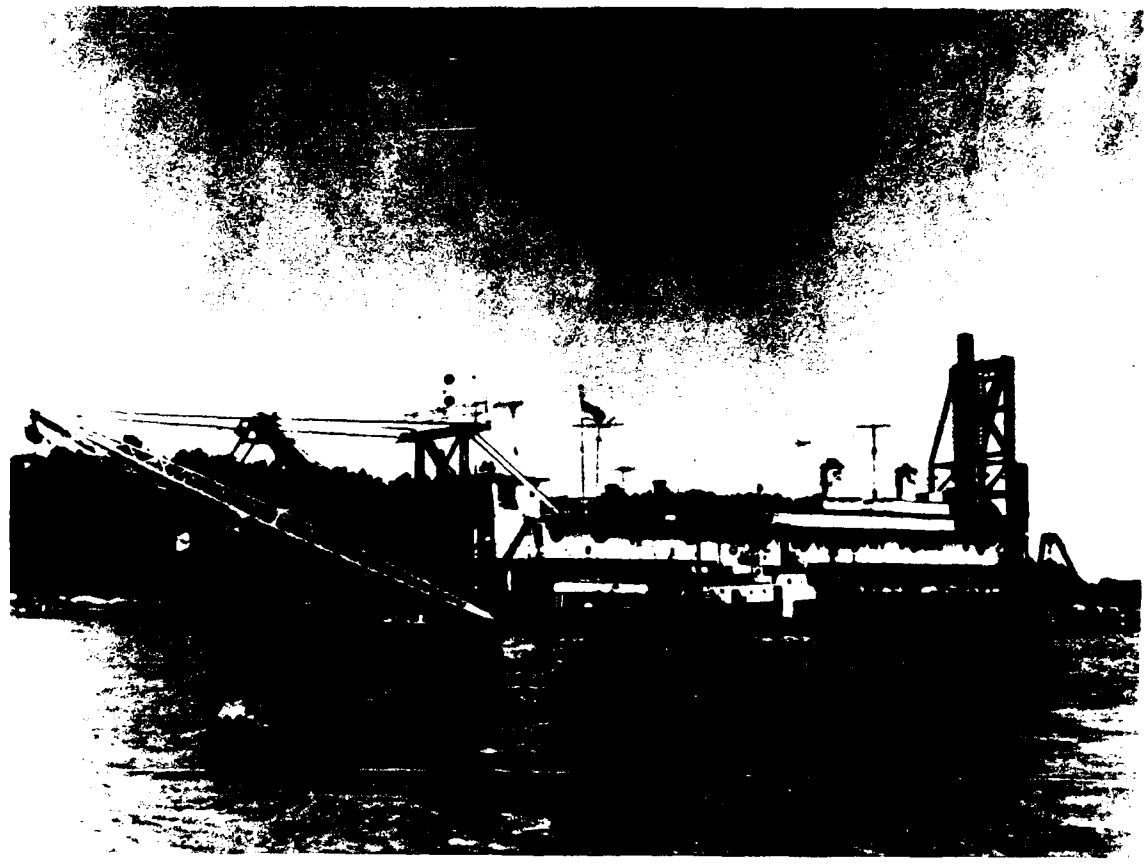
The location of the dredging zone with respect to the desired placement area is often a controlling condition in determining the feasibility of using dredged material for nourishment purposes. As distance to the placement site increases, so does cost of placement as a result of various project-specific factors such as: (a) mobilization of additional equipment, (discharge pipelines, booster pumping stations, hopper dredge tie-up barges, etc.); operating costs of additional equipment; and reduction of dredge production due to extended discharge distances or increased dredging cycle times in the case of hopper dredges.

EQUIPMENT FACTORS

The type and size of dredging equipment employed for a particular project can substantially influence the cost and operational feasibility of material placement for beach nourishment purposes. In this regard, there are three basic types of dredging plants primarily used to excavate navigation projects in the coastal and Great Lakes regions; namely: (a) hydraulic cutter-suction pipeline dredges; (b) hydraulic trailing-suction hopper dredges; and (c) mechanical grab or bucket dredges. The following commentary is made in reference to the effects of the dredging equipment on placement of dredged material for beach nourishment purposes.

- CUTTER-SUCTION PIPELINE DREDGE. The design of the conventional "pipeline" dredge limits its application to environments having low levels of wave action and its relatively infrequent use in the ocean or ocean entrance channels is limited to low energy conditions in which wave heights do not generally exceed about 2 feet. This type of dredge produces a continuous flow of a water-sediment slurry that is conveyed from the dredging vessel to the disposal area by pipeline, see Figure 1. Therefore, it is the ideal equipment for use in placing dredged material directly on a beach strand. Conversely, it is not a practical means of nearshore profile nourishment in oceanic or Great Lakes areas due to the difficulties of handling and securing pipelines in wave environments. With respect to cost considerations and economic feasibility, the distance from the dredging site to the disposal area is usually the primary controlling factor. As distance increases, more pipeline and supporting equipment are required, and production rates diminish, thereby prolonging operating times and adding to project costs. A brief discussion of the affects of distance on dredge production is presented below.

  As in all closed hydraulic systems comprised of a pump, suction/discharge pipelines and attendant fittings, the production or flow rate is largely dependent on the available pump power output, the elevation to which the flow volume is discharged above the suction-side water level, and the energy losses induced by friction and other effects related to the pipelines and fittings. There are more factors that affect dredge production per se, but these exist irrespective of beach placement considerations and will not be discussed here. The extent to which the discharge distances affect dredge production and hence costs, is illustrated by Table 3 extracted from Reference [3]. These data were developed on the common basis of dredging loose sand deposits at a depth of 35 feet and pumping the material under average conditions. The sizes of "pipeline" dredges, as shown in Table 3, are always given in terms of the inside diameters of the dredge pump discharge flanges, and often with additional reference to pump power in units of horsepower. It will be noted that the data represent two production conditions, viz., full production and the lower limits of production. The former condition is controlled by the degree of vacuum pulled by the pump and the dredging rate is the same for pipeline lengths equal or less than the recorded value. Beyond that point, as longer pipelines are used, more and more pump power is developed until the maximum output is reached, after which discharge velocities diminish with increasing length of pipeline.



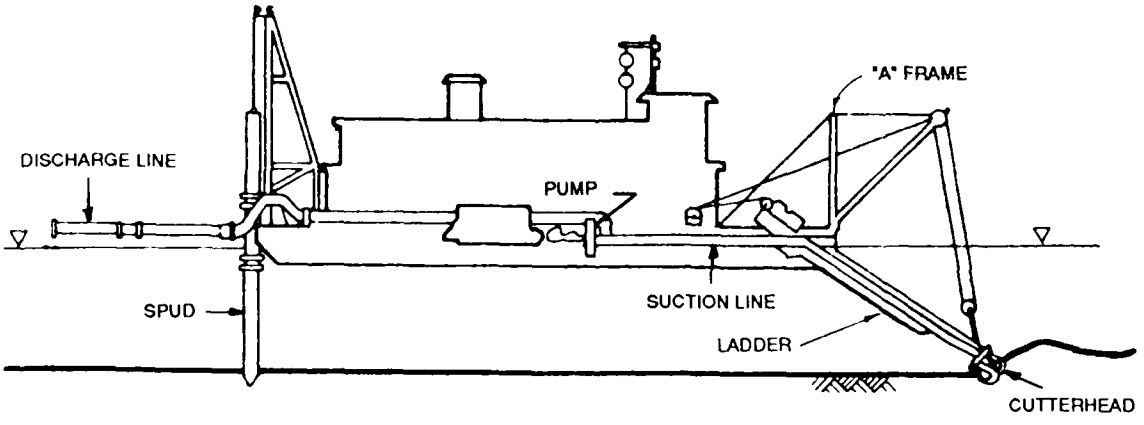


FIGURE 1 CUTTER-SUCTION PIPELINE DREDGE

TABLE 3

STANDARD CUTTER-SUCTION PIPELINE DREDGE PRODUCTION

DREDGE SIZE (in.)	PUMP POWER OUTPUT	FULL PRODUCTION		LOWER LIMITS OF PRODUCTION	
		PIPELINE LENGTHS EQUAL OR LESS THAN (hp)	QUANTITY OF DREDGED MATERIAL (ft.)	MAXIMUM PIPELINE LENGTHS (yd^3/hr)	QUANTITY OF DREDGED MATERIAL (ft.) (yd^3/hr)
10	500	2,000	200	4,000	130
12	700	2,500	270	5,000	180
14	1000	3,000	380	6,000	250
16	1300	3,500	500	7,000	330
18	1600	4,000	650	8,000	420
20	2000	4,000	800	8,000	520
24	3000	5,000	1,200	10,000	780
27	4000	5,500	1,500	11,000	980
30	5200	6,000	1,800	12,000	1,170
32	6700	6,000	2,100	12,000	1,370

The reduction in flow velocity (and concomitant reduction in dredging rate) continues until it is insufficient to carry sediment in suspension and solids begin to settle in the pipeline. This is the second condition (lower limits of production) given in Table 3 and in all cases, is reached when the pipeline lengths are about twice as long as the maximum lengths recorded for the full production condition. At the lower limits, the dredging rate is reduced approximately 35 percent below the full production value. Where pumping distances to the placement zone exceed the pipeline lengths recorded for the lower limit of production, booster pumping stations must be added. These units constitute major and costly pieces of equipment to operate and in addition, their installation increases the likelihood of system breakdown. Normal expectations are that each booster pump unit will increase project time by 10 to 15 percent as a result of breakdown, thereby further increasing project costs.

- TRAILING-SUCTION HOPPER DREDGE. Unlike the "pipeline" dredge the "hopper" dredge is designed to operate in a wave environment and as shown in Figure 2, this type of dredge has the characteristics of a sea-going vessel. Accordingly, it is the principal type of equipment used in dredging ocean entrance channels though it is also employed for the excavation of interior channels and harbor basins. Furthermore, it differs from the "pipeline" dredge in not being capable of providing for a continuous flow of dredged material from the point of excavation to the disposal area. Rather, the dredged material is collected in the vessel's hopper(s) or bin(s) until the material storage capacity is reached, at which time the material is conveyed by the vessel to the point of discharge. Thus, the "hopper" dredging operation is a cycle comprised of two phases, i.e., dredging and discharge. As a rule, dredged material is disposed in open waters by a rapid, mass release of the material from the vessel through bottom doors or in some recent designs (split-hull), by a rotational separation of the vessel's hinged half-hulls. This conventional method of material discharge, i.e., bottom dumping, normally relegates the "hopper" dredge to nearshore profile nourishment when the dredged material is to be used for beach erosion control purposes. With this mode of disposal, added costs of nearshore placement result essentially from increased travel time to reach and return from the disposal zone.

Physical or operational constraints related to the functional feasibility of nourishing a particular portion of the nearshore profile are controlled by the dredging vessel's loaded draft and the required safe keel clearance as dictated by the existing wave action and associated vertical movements of the dredging vessel. The basic characteristics of the U.S. Hopper Dredge Fleet are given in Table 4 extracted from Reference [4]. It will be noted that loaded drafts range

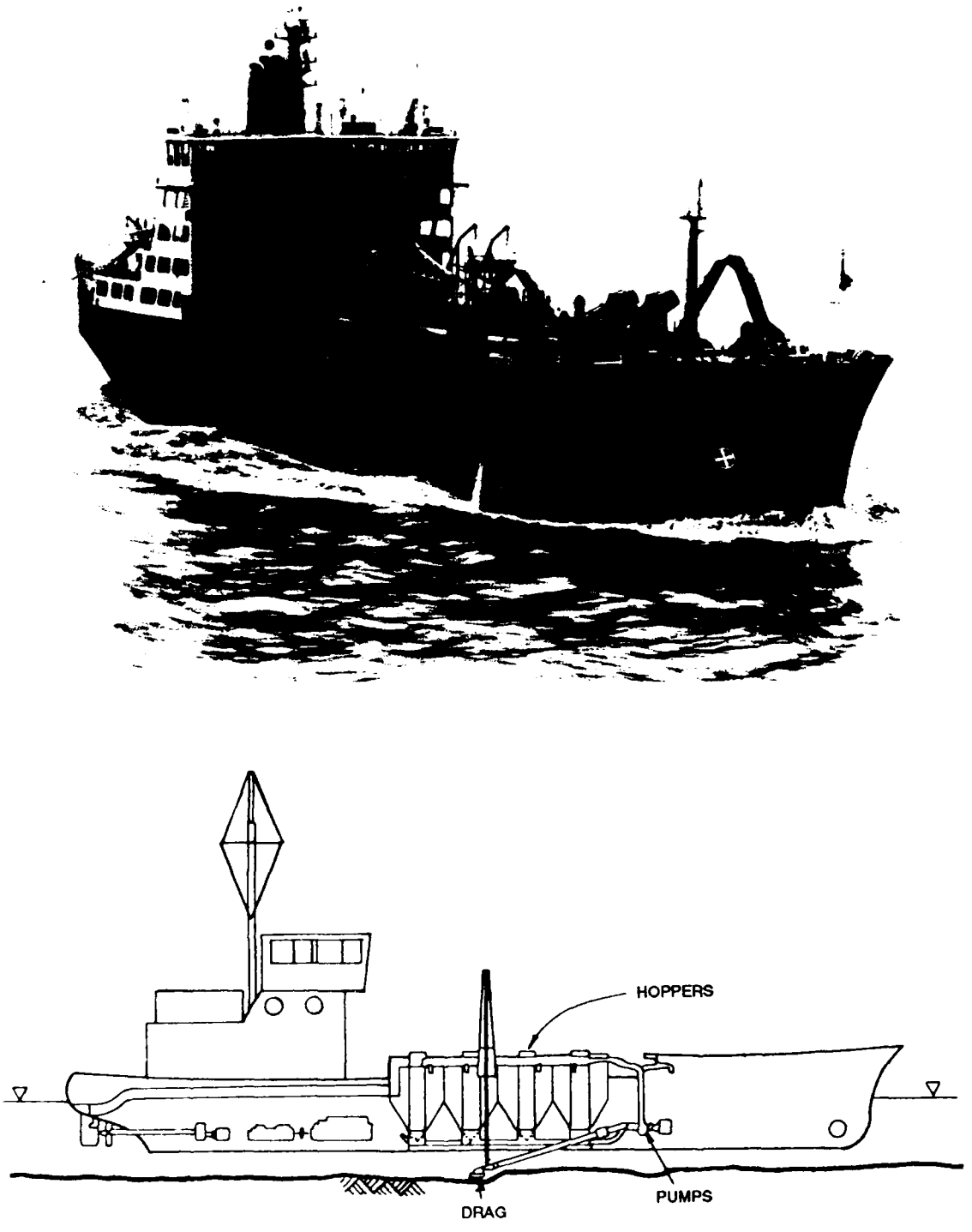


FIGURE 2 SELF-PROPELLED SEAGOING HOPPER DREDGE

TABLE 4

HOPPER DREDGE PHYSICAL DATA

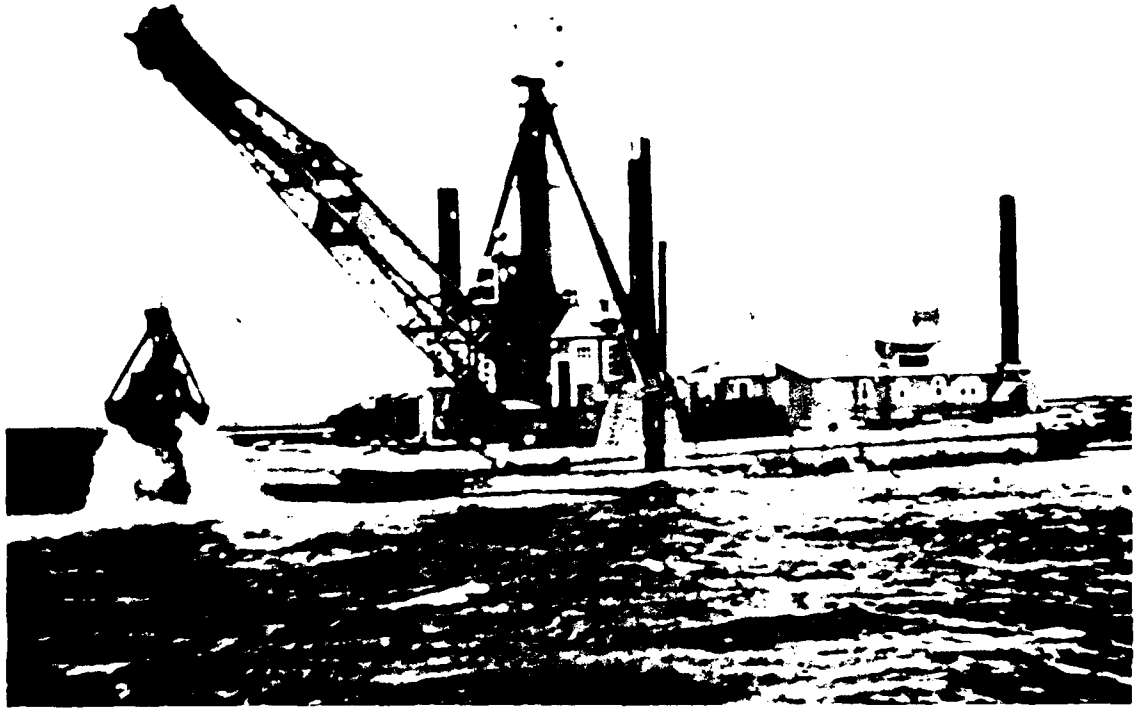
DREDGE NAME	OWNERSHIP	MAX. HOPPER SAND LOAD (CU. YDS.)	LIGHT DRAFT (FT.)	LOADED DRAFT (FT.)	DIRECT PUMP-OUT CAPABILITY
ESSAYONS	U.S. GOVERNMENT	4800	15	27	YES
WHEELER	U.S. GOVERNMENT	6000	16	30	YES
MCFARLAND	U.S. GOVERNMENT	2100	17	26	YES
YAQUINA	U.S. GOVERNMENT	1300	10	14	YES
ATCHAFALAYA	PRVT. INDUSTRY	1300	6	15	YES
DODGE ISLAND	PRVT. INDUSTRY	2800	10	19	YES
EAGLE I	PRVT. INDUSTRY	3000	11	22	YES
LONG ISLAND	PRVT. INDUSTRY	13600	9	27	YES
MANHATTAN IS.	PRVT. INDUSTRY	3000	8	19	NO
MERMENTAU	PRVT. INDUSTRY	1300	6	15	YES
NEWPORT	PRVT. INDUSTRY	3000	6	17	NO
NORTHERLY IS.	PRVT. INDUSTRY	2200	5	15	YES
OWACHITA	PRVT. INDUSTRY	4200	12	21	NO
PADRE ISLD.	PRVT. INDUSTRY	3100	8	19	NO
STUYVESANT	PRVT. INDUSTRY	9200	17	29	OPT.
SUGAR ISLD.	PRVT. INDUSTRY	2800	10	19	YES
WESTPORT	PRVT. INDUSTRY	1500	8	14	YES

from 14 to 30 feet. Considering that keel clearances under normal sea conditions will be at least 5 feet at mean water level, minimum disposal depths normally range from 19 to 35 feet. This limits nourishment capabilities of "hopper" dredges to the outer and least active portions of most beach profiles.

Though it is generally agreed that profile nourishment is beneficial, even at depths of 19 feet or more, the fate of material placed in that manner in terms of quantifiable erosion control value is the subject of considerable ongoing research.

Many of the "hopper" dredges in the present fleet, as shown in Table 4 are also capable of direct pump-out of dredged material. That is, these particular dredges are equipped to discharge their hopper(s) through a pipeline by means of a centrifugal pump, as an alternative to rapid bottom-dump releases in open water. This provides capability of placing material in confined upland disposal sites or along beach strands for nourishment purposes. To effect direct pump-out, the "hopper" dredge must connect to a mooring or be berthed along a barge or dock in order to make connection with the discharge pipeline and complete the hopper emptying process. The addition of considerable time to the dredging cycle resulting from mooring or berthing, and pumping out the hopper(s), as well as the cost of mobilizing a mooring or barge, pipeline and other equipment, and personnel, dramatically increase project cost when direct pump-out is used. Also, all cost related factors concerning discharge distance and production as discussed under cutter-suction pipeline dredges apply when the "hopper" dredge is in a direct pump-out mode of operation. The high added cost of using a "hopper" dredge to place dredged material along a beach by the direct pump-out method limits the number of such applications that can be economically justified.

- MECHANICAL GRAB DREDGES. These dredges, as illustrated in Figure 3, are essentially floating derricks which operate by lowering an open grab bucket usually of the common clamshell type, onto the material to be dredged. As the hoisting wire is tightened, the bucket closes and fills itself and is raised for the material to the placed in a waiting barge or scow. When filled, the barge or scow is moved to a disposal site. This is usually in open water where the dredged material is rapidly dumped. Accordingly, use of material from such an operation for beach erosion control purposes usually takes the form of nearshore profile nourishment. Rarely is the material removed from the barges for direct placement on a beach strand due to the high costs that would be associated with a "double-handling" operation.



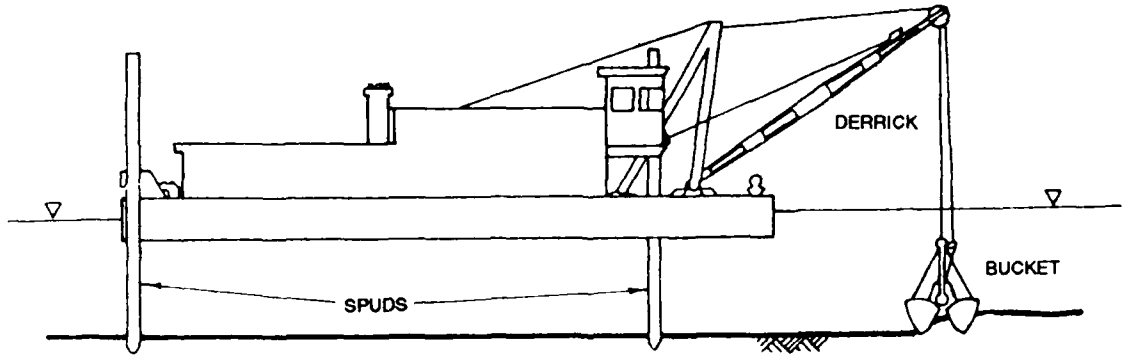


FIGURE 3 BUCKET DREDGE

INSTITUTIONAL FACTORS

Assuming there are no constraints imposed by environmental, material and/or equipment factors, institutional factors may still control the feasibility of productively using dredged material for beach nourishment purposes. Among these, the most important ones are: (a) limitations on budgetary resources; (b) use or restrictions on the beach area, i.e., open to use of the general public or private use only; (c) economic considerations in terms of established benefit/cost analysis and policies; (d) availability of funds for defraying added costs of material placement; (e) provision by local interests of any necessary additional lands, easements, rights-of-way and relocations required for the placement operation; (f) designation of the specific material placement area; and (g) timing considerations. Each of these factors are discussed below.

- LIMITATIONS ON BUDGETARY RESOURCES. Department of Army policy precludes the budgeting of Army Civil Works resources for new recreation-oriented activities. Shore protection activities that produce hurricane and storm damage reduction benefits (reduction in damages to facilities) will receive favorable consideration in the budgetary prioritization process. Generally, a project is considered recreation-oriented if over half of the project benefits are recreation.

  In addition to this budgetary policy specific to recreation, there is pressure to constrain Army Civil Works operations and maintenance programs because of Federal budgetary deficits. Intensive management of these activities could lead to deferral or reduction in maintenance that will impact upon the availability of material for beach nourishment.

- BEACH USE. As previously shown, participation or sharing by the Corps of Engineers in the added costs of material placement requires that the involved beach area be open to use by the general public on equal terms. This requirement goes beyond simple designation of the beach as being open to the public but necessitates provision of adequate access and parking facilities to accommodate the projected public use. However, this does not preclude local interests from charging uniform and reasonable beach-use fees to recover the local share of material placement costs or to collect normal fees for use of facilities such as parking lots or bathhouses. If the beach is for private use only, dredged material may be placed, without Corps participation in the added costs, providing there is a public interest.

- ECONOMIC CONSIDERATIONS. The participation of the Corps of Engineers in the cost of dredged material placement for beach nourishment purposes must be justified in accordance with economic analysis procedures generally applied to civil works projects. In the case of

beach nourishment projects, Federal participation in cost sharing not only requires a benefit to cost ratio of at least unity but also, certain conditions must be met with respect to the relative values of the benefit categories. The benefit categories are hurricane and storm damage reduction, land loss prevented and recreational usage. Hurricane and storm damage reduction benefits accrue from the protection afforded by a beach fill to private and public facilities such as roads, buildings, utilities, etc. Also, if the land in question is in a developed state, the value of land that would otherwise be lost to erosion is considered to be a Storm Damage Reduction benefit. The specific Land Loss Prevented benefit category is applied only to the evaluation of benefits obtaining from beach fills formulated to protect Federally-owned land or non-Federal publicly owned land dedicated to park and/or conservation uses. There is no Federal participation in the prevention of land loss of privately owned undeveloped properties. Benefits accruing from beach fills as a result of recreational usage are accepted for project justification if two conditions are satisfied. First, the fill design features must be formulated solely for the purpose of preventing storm damages along developed shores. Thus, recreational usage of such a fill is considered "incidental" to the purpose of the fill design. This particular condition does not prevent recreational usage of such fills inasmuch as beach fills designed for protective purposes are highly compatible with normal recreational uses. The second condition, however, is that the "incidental" recreational benefits cannot exceed 50 percent of the total benefits used for project justification in terms of Federal cost participation. Under this criterion it is obvious that the classification of "incidental" applies only to the purposes of the fill design features and not necessarily the magnitude of acceptable benefits used in project justification. On the other hand, if a particular feature is provided in a fill design, such as additional berm width, for the specific purpose of accommodating recreational use beyond that which is attainable along a purely protective fill, such a feature and attendant recreational benefits are classified as "separable." In that case, the Department of the Army has adopted a budgetary priority policy which precludes Federal participation in the cost of separable recreation features for beach fills as well as other types of water resources projects. The basic policy on Federal cost sharing when recreational benefits are involved in elucidated by hypothetical case examples in Table 5 which has been extracted from the previously referenced ER 1165-2-130.

TABLE 5

FEDERAL PARTICIPATION IN SHORE PROTECTION PROJECTS THAT INCLUDE RECREATION FACILITIES OR GENERATE RECREATION BENEFITS

ITEM	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
Hurricane & Storm Damage Reduction (H&SDR) Benefits	>50%	>50%	<50%	<50%	<50% a/
Recreation Benefits	<50%	<50%	>50%	>50%	>50%
Annual Charges ($)	10	10	10	10	10
H&SDR	(10)	(6)	(9)	(10)	(10)
Rec. (Incidental)	(0)	(0)	(0)	(0)	(0)
Rec. (Separable)	(0)	(4)	(1)	(0)	(0)
Annual Benefits ($)	11	12	11	23	12
H&SDR	(6)	(7)	(4)	(11)	(6)
Rec. (Incidental)	(5)	(0)	(4)	(12)	(7);(6) b/
Rec. (Separable)	(0)	(5)	(3)	(0)	(0)
BCR	1.1	1.2	1.1	2.3	1.2
H&SDR only	(0.6)	(1.2)	(0.4)	(1.1)	(0.6)
H&SDR & Rec. (I)	(1.1)	(1.2)	(0.9)	(2.3)	(1.2)
Rec. (S) only	(0)	(1.3)	(3.0)	(0)	(0)
Net Annual Benefits ($)	+1	+2	+1	+13	+2
Federal (Corps) Participation	Yes	Yes-H&SDR No-Rec.(S)	No	Yes	Yes

a/ >50% means "greater than 50%".
<50% means "less than 50%".

b/ Benefits limited to the level of primary (H&SDR) benefits, or limited to an equivalent amount of primary (H&SDR) benefits.

CASE 1- Federal participation in this recreation benefit generating shore protection (SP) project is warranted since the recreation benefits are incidental, comprise less than 50 percent of total benefits, and, when combined with the primary H&SDR benefits, produce an economically justified project (i.e., project is not justified on H&SDR benefit alone).

CASE 2 - Federal participation in this recreation benefit generating SP project is limited to the portion that generates primary H&SDR benefits (i.e., H&SDR portion of overall project is separably economically justified). Federal participation in the separable recreation of the overall project is restricted by Army budgetary policy even though it is separably justified.

CASE 3 - Federal participation in this recreation benefit generating SP project is not warranted since separable recreational benefits are necessary to justify the overall project (i.e., project is not justified based on primary H&SDR benefits alone, or on the combination of H&SDR and incidental recreation benefits, with incidental recreation benefits limited to an equivalent amount of H&SDR benefits).

CASE 4 - Federal participation in this recreation benefit generating SP project is warranted since the recreation benefits are incidental and, even though they comprise over 50 percent of total benefits, they are not necessary for project justification (i.e., project is justified based on primary H&SDR benefits alone).

CASE 5 - Federal participation in this recreation benefit generating SP project is warranted since recreation benefits are incidental, and, when combined with and limited to an equivalent amount of primary H&SDR benefits, they produce an economically justified project.

- AVAILABILITY OF FUNDS. Obtaining the wherewithal to finance the added costs of dredged material placement for beach nourishment purposes, and phasing the availability of funds with the scheduled dredging of a particular navigation project can often be problematic. The complexity of this matter increases with the number of cost sharing participants which could, in some cases, involve a combination of the Corps of Engineers and state, county and municipal governments as well as private funding sources. Assuming support at all levels for dredged material placement, problems of financing can generally be minimized through advance coordination and foreknowledge by all parties of the locations of potential placement sites, estimated quantities of dredged material suitable for nourishment purposes, estimated costs of material placement and related cost shares, and the schedule of future dredging operations.

- LANDS, EASEMENTS, RIGHT-OF-WAY AND RELOCATIONS (LERRs). Non-Federal interests must provide all LERRs necessary for placement of dredged material. If the placement operation is authorized as a specific feature of a navigation or shore protection project, the values of LERRs are considered elements of the total project cost and the project sponsor is credited for provision of LERRs in the cost sharing schedule in accordance with Section 103(i) of WRDA 1986. However, when Section 933, WRDA 1986 is applied to a placement operation, Federal participation only pertains to the incremental costs of the dredged material placement, and in that case, the costs of LERRs must be borne totally by local interests. In any case, the provision of LERRs, if required, is another matter which demands attention far in advance of anticipated placement operations.

- DESIGNATION OF PLACEMENT AREA. Disputes can arise in regard to the selection of an area for dredged material placement when two or more potential beach placement sites are located near a dredging operation. Such disputes are not uncommon at coastal inlets where the adjacent beach communities may have simultaneous needs for the placement of dredged material. When the volume of dredged material in a single dredging project is sufficiently large, the resolution of multiple demands for material placement can usually be reached by an agreed sharing of the available material through separate placement operations, providing the associated benefits can support the added cost. Otherwise, agreements should be sought for alternate periodic placement sequences, particularly when the source of material involves maintenance dredging project that has a reasonably well established periodic schedule.

- TIMING CONSIDERATIONS. The time span between the recognition of a need to consider using dredged material for beach nourishment purposes and actually fulfilling such a need can be considerable, and almost in no case can a response be immediate in terms of actual material placement. For example, when use of the material is incorporated in a new navigation project or hurricane and storm damage protection project, many years may transpire between the authorization of studies and the appropriation of project construction funds. Even when the material placement is to be accomplished under the expediency of Section 933, WRDA 1986, investigations must be conducted which may require 12 months or more to complete. Further, budgetary requests usually have to be introduced about 18 months in advance of budget finalization and approval. These time constraints and others previously mentioned, demonstrate the need for advanced planning at all levels of government.

IV. UTILIZATION OF DREDGED MATERIAL

GENERAL

The previously referenced Corps dredging regulation, Engineering Regulation (ER) No. 1130-2-307 promulgated in 1968, codified an organizational policy to beneficially utilize dredged material to the maximum practicable extent consistent with existing authorities. In the three decades that have passed since the issuance of ER 1130-2-307, applications of dredged material for purposes of beach nourishment and erosion control have progressively increased in number. An initial assessment of the extent to which such applications of dredged material were being made, and the constraints imposed on that beneficial use of material by institutional factors, was performed by the Army Engineer Institute for Water Resources (IWR) in 1981, see Reference [5]. The findings of that prior study provide a basis to evaluate changes that have occurred in the subject use of dredged material in recent years as a result of increasing demands for beach nourishment and the related influence of the cost sharing provisions contained in Section 933, WRDA 1986.

PRIOR STUDY FINDINGS AND CONCLUSIONS

The referenced 1981 IWR study was primarily conducted to determine if institutional constraints limited the use of dredged material for beach nourishment purposes. In that study, an institutional constraint was defined as a legal, attitudinal, financial, procedural or related constraint, and included the requirements of state laws which exceed Federal water quality standards and the unwillingness of non-Federal governments to finance incremental costs. The definition excluded preference of non-Federal interests for an alternative use of dredged material, the physical unsuitability of dredged material for beach nourishment, unacceptable adverse environmental impacts under Federal standards, and operational constraints related to physical conditions, equipment availability, incremental costs, and lack of need for beach nourishment.

The study covered a 3-year period (fiscal years 1978 thru 1980) and evaluated methods of dredged material placement and the constraints to beach nourishment based on information furnished by 18 district and 2 division offices of the Corps having Coastal and Great Lakes dredging missions. The Pacific Ocean Division was excluded from the study.

A total of 211 navigation projects were examined, of which 25 projects were in a planning, design or construction phase; 141 were existing projects requiring annual maintenance dredging; and 45 were existing projects for which maintenance dredging was provided at intervals greater than 1-year. Within

that overall group of navigation projects, a total of 52 or about 25 percent involved planned or actual use of dredged material for beach nourishment purposes. The actual and potential uses were reported by 13 out of 20 offices involved in the study. The major findings of the study were as follows:

- Institutional factors are infrequently major or decisive constraints to the use of dredged material for beach nourishment purposes.

- There are no institutional factors which consistently recur as major or decisive constraints to the use of dredged material for beach nourishment purposes.

- Corps districts and divisions responsible for dredging routinely evaluate beach nourishment as a dredged material disposal alternative.

- For approximately half of dredging projects, beach nourishment does not merit consideration as a method of dredged material disposal. Dredged material from approximately one-fourth of dredging projects is used for beach nourishment purposes. For the remaining one-fourth of projects, beach nourishment is decisively constrained by cost-related factors, lack of need and/or institutional factors.

- New work navigation projects differ from maintenance dredging projects in the mix of constraints to beach nourishment. In particular, beach nourishment using material from maintenance dredging is more likely to merit consideration but is also more likely to be decisively constrained by cost-related factors or lack of need. These findings probably reflect the more deliberate and detailed planning scrutiny given to new work projects.

- For the maintenance projects for which beach nourishment is decisively constrained by cost and/or lack of need, it is difficult to identify post facto the respective roles of the Corps of Engineers and of non-Federal governments in determining that beach nourishment is not needed and/or is too expensive.

- Most of the navigation projects using dredged material for beach nourishment are located in the Jacksonville, Mobile, Los Angeles and Detroit Districts.

- Most uses of dredged material for beach nourishment do not involve financial participation by entities other than the Corps.

- The methods of on-land nourishment and of deposition of material in the littoral zone are used equally frequently to nourish beaches with dredged material.

- Section 145 of the 1976 Water Resources Development Act has had little effect outside the State of Florida in inducing non-Federal financing for any incremental costs of using dredged material for beach nourishment, largely because Section 145 does not represent any major departures from previous practice.

The study reached three conclusions, namely:

- By and large, Corps of Engineers districts and divisions responsible for dredging have implemented a high proportion of suitable opportunities to use dredged material for beach nourishment.

- Corps of Engineers districts and divisions responsible for dredging may be able to increase the frequency with which material from maintenance dredging projects is used for beach nourishment. This may be done by assuring, when beach nourishment merits consideration as a disposal alternative, that prompt, focused and continuous communication is undertaken with the affected non-Federal units of government regarding incremental costs, beach nourishment needs and institutional constraints. Amendment of Section 11 of ER 1130-2-307, "Project Operation: Dredging Policies and Practices," 31 October 1968, to emphasize improved communication may be warranted.

- Detailed study of potential modifications to cost sharing policy for the purpose of increasing the frequency with which dredged material is used for beach nourishment is not warranted at this time.

CURRENT EXAMINATION OF APPLICATIONS

Information on the Corps' recent applications of dredged material for beach nourishment and erosion control purposes was obtained, for this study, from all Corps division and district offices having dredging responsibilities in the U.S. Coastal and Great Lakes regions. A listing of offices and personnel participating in the provision of information is given in Appendix A. The initial request for relevant data was made through a set of questionnaire spreadsheets with accompanying letters of transmittal and instructions, see copies contained in Appendix B. Supplemental field information was obtained by

telephone communications. Additional information was furnished by the Corps Civil Works Directorate; specifically the Dredging and Navigation Branch (Operations, Construction and Readiness Division).

In reference to Appendix B, it will be noted that information was requested in terms of three general categories of navigation projects involving the subject use of dredged material, namely: Category A - projects being planned, designed or under construction for which use of the dredged material from new work was being used for the subject purpose; Category B - existing projects in which use of the material was being made during maintenance operations; and Category C - existing projects being evaluated or near the study implementation stage for use of maintenance dredged material under authority of Section 933, WRDA 1986. The questionnaires concerning Categories A and B called for the authorities under which the dredged material was being placed, the quantities of material utilized and the specific types of nourishment or erosion control uses being applied. Specific uses were divided into three basic types: i.e., direct beach fill; nearshore profile nourishment referred to as "feeder berms"; and offshore "stable mounds". The latter use represents a new Corps initiative to increase the beneficial applications of dredged material in the interest of beach erosion control when beach fill or profile nourishment are precluded by the physical characteristics of the material, draft requirements of large trailer suction hopper dredges and/or excessive added costs associated with beach or nearshore material placement. Stable mounds are developed by offshore dredged material placement along essentially shore-parallel lines and in water depths usually greater than 25 feet so as to minimize material dispersal by waves and currents. Placement is accomplished by hopper dredges or dump-barges when the dredging operations are being accomplished by mechanical bucket dredges. Stable mounds can be developed with dredged material either suitable or unsuitable for beach fill. In the former case, mounds may be placed for the purpose of attenuating shore-directed wave energy during extreme storm events or alternatively, as a future least-cost source of beach fill with only intermittent or incidental value as a wave energy filter. In some situations, the offshore storage of material in mounds for future beach filling offers economies of scale by minimizing overall mobilization costs and providing sufficient volume of material to economically justify future beach filling operations. In the second case, that is, when the dredged material is not suitable for beach fill, offshore stable mounds are placed for the basic purpose of attenuating shore directed wave energy. In addition to erosion control benefits and the stockpiling of future beach fill, the accentuated seabed reliefs associated with offshore mounds are also expected to have beneficial impacts on fisheries resources.

The current investigation of Corps use or planned use of dredged material for nourishment or beach erosion control purposes covers the 3-year period from fiscal year 1986 through fiscal year 1988. A total of 348 navigation projects in all categories were examined. This included all navigation dredging projects conducted within the Corps' coastal and Great Lakes districts in the 1986-1988 period

according to data contained in the Civil Works Information System. The results of the investigation are presented below.

- CATEGORY A--PROJECTS BEING PLANNED, DESIGNED OR UNDER CONSTRUCTION (FY-1988)

  There are 25 projects in this category which together involve the beneficial application of about 76 million cubic yards of material from new work excavation and an anticipated 15 million cubic yards annually from maintenance dredging operations. The project names, locations, quantities, uses and authorities related to the placement of dredged material in this category are listed in Table 6. It will be noted that the largest single use, 14 projects, is direct beach fill placement with 1 additional project applying a combination of beach fill and "feeder berm" for profile nourishment. One large project under construction (Norfolk Harbor Channel, VA) will potentially involve 10 beach areas to receive material under authority of Section 933, WRDA 1986 and in those cases, all possible uses are being considered. One of the beaches (Virginia Beach) has already received material by direct beach fill placement under the Section 933 authority. The 9 remaining Section 933 studies for the Norfolk project are included under Category C, see Table 8. The second largest single reported use, 7 projects, involved profile nourishment through placement of "feeder berms". The two remaining projects use offshore stable mounds--one of which is for future beach fill storage and the other for wave energy attenuation. The authorities for placement of the dredged material vary with 12 using the least costly dredged material disposal policy and 12 applying authorities which require non-Federal cost sharing. Additionally, one project is being conducted to demonstrate the feasibility of feeder berm placement at that particular location and is being totally funded by the Corps with the expectation that feeder berm placement will, in the near future, constitute the least costly dredged material disposal alternative for the project site. It should be noted that non-Federal cost participation by navigation project sponsors is required for all new work dredging and associated nourishment placements of dredged material (i.e., disposal costs) in accordance with Section 101, WRDA 1986. Therefore all projects under this category require non-Federal cost sharing for nourishment placements of material notwithstanding that the placements constitute the least cost disposal alternatives. However, subsequent beach nourishment placements of material from maintenance dredging operations would not require non-Federal cost participation when such placements would be performed in a least cost manner.

Table 6
NAVIGATION PROJECTS BEING PLANNED, DESIGNED OR UNDER CONSTRUCTION WHICH INCLUDE USE OF DREDGED MATERIAL FOR BEACH FILL, NEARSHORE FEEDER BERMS OR STABLE MOUNDS
(This list does not include projects being studied under Section 933, WRDA 1986)

Division & District Offices	Project Name & State	Quantities of Material & Use				Funding Basis of Author
		New Work		Maintenance		
		Volume (1000 CY)	Use	Volume (1000 CY)	Use	
New England Division	Woods Island Harbor, ME	--	--	12	B	Sec.107
North Atlantic Division						
New York District	Moriches Inlet, N.Y.	100	FB	100	FB	LC
	Shinnecock Inlet, N.Y.	552	B & FB	304	FB	LC
Philadelphia District	Barnegat Inlet, N.J.	937	B	60	B	LC
	Great Egg Harbor, N.J.	4100	B	357	B	SPP
	Cape May, N.J.	1450	B	180	B	Sec.940
	Indian River Inlet, DE	--	B	100	B	Sec.940
	Wills Hole Thoroughfare, N.J.	99.3	B	9.5	B	LC
Norfolk District	Norfork Harbor Channels, VA[1] (10 separate beaches)	32,000	All Uses being considered	3,000	All uses being considered	Sec.933
	York River Entrance Channel, VA	--	--	1,800	MW	SPP
	Bennett Creek, VA	55	B	38	MW	SPP
South Atlantic Division						
Wilmington District	Morehead City Harbor, N.C.	3,100	B	1,000	B	SNF
Savannah District	Brunswick Harbor, Fl	1,400	FB	1,000	FB	SNF
Jacksoville District	Kings Bay Entrance Channel, FL	2,157	B	1,300	B	LC, Sec.145
	Kings Bay Entrance Channel, FL	1,633	MB	--	--	Sec.145
	Fort Pierce Harbor, FL	350	B	32	B	SNF, LC
Mobile District	Gulfport Harbor, MS	2,590	FB	190	FB	LC
	Pascagonla Harbor, MS	3,348	FB	33	FB	LC
	Mobile Harbor, AL	18,680	MW	5,000	MW	LC
	Mobile Harbor, AL	656	FB	--	--	LC

[1] One of these beaches (Virginia Beach) has been nourished under Section 933 authority and the remaining nine beaches are under study.

Table 6 (Continued)

Division & District Offices	Project Name & State	Quantities of Material & Use				Funding Basis of Author
		New Work		Maintenance		
		Volume (1000 CY)	Use	Volume (1000 CY)	Use	
Southwestern Division						
Galveston District	Freeport Harbor, TX	600	B	--	--	LC
	Mouth of Colorado River, TX	600	FB	300	FB	LC
	Brazos Island Harbor, TX	1,300	B	360	FB	Demonstration project with Maintenance Material (No Cost Sharing)
North Central Division						
Detroit District	Sturgeon Bay Harbor, WI	6	B	as required	B	Sec.940
Buffalo District	Fairport Harbor, OH	27	B	27	B	Sec.940
	Toussaint River, OH	46	FB	8	FB	LC
	Sturgeon Point	31	B	9	B	LC
Totals		75,817		15,220		

Codes

Uses:

- B = Beach Fill
- FB = Feeder Berm of nearshore profile nourishment
- MB = Stable mound for storage as future source of beach fill
- MW = Stable mound for wave energy attenuation

Authorities:

- LC = Least costly dredged material disposal
- SNF = Seperable feature of an authorized navigation project
- SPP = Feature of an authorized navigation project

- CATEGORY B--EXISTING NAVIGATION PROJECTS WHICH USE MAINTENANCE DREDGED MATERIAL FOR BEACH FILL, NEARSHORE FEEDER BERMS OR OFFSHORE STABLE MOUNDS

Over the 3-year period of investigation, FY 1986 - FY 1988, 95 projects were in this category and involved 143 beach nourishment or erosion control material placement operations, see Table 7. A total of 46.9 million cubic yards of dredged material were placed, of which 19.3 million cubic yards were deposited in FY 1986, 17.9 million in FY 1987 and 9.7 million in FY 1988. The major use, 121 operations, was in direct placement of beach fill. Of the remaining 22 operations, 21 placed feeder berms for nearshore profile nourishment, and 1 large operation of 4.0 million cubic yards placed material in an offshore stable mound as a future source of beach fill. With respect to funding authorities, the preponderant number of operations, 123 or 86 percent were classified as the least costly dredged disposal alternative and did not require non-Federal cost sharing. Similarly, 10 operations, at total Federal cost, were performed under authority of Section 111, RHA 1968 for mitigating erosion damages induced by the related navigation projects. The remaining 10 operations were cost shared with non-Federal interests. Three of these were integral to authorized shore protection projects, three more were separable features of navigation projects, and four operations were requested by states and conducted under authority of Section 145, WRDA 1976.

- CATEGORY C--EXISTING NAVIGATION PROJECTS FOR WHICH STUDIES ARE IN PROGRESS OR SCHEDULED TO INVESTIGATE USE OF MAINTENANCE DREDGED MATERIAL FOR BEACH AND/OR PROFILE NOURISHMENT PURPOSES UNDER AUTHORITY OF SECTION 933, WRDA 1986.

This category contains 32 individual Section 933 studies, see Table 8. In addition to the projects listed in Table 8, inquiries to division and district offices participating in this study revealed that there are 6 additional navigation projects which may warrant Section 933 studies in the near future. Furthermore, there was a widely held view expressed by Corps personnel that increases in the use of dredged material for beach nourishment could potentially be gained if efficient, rapid connect/disconnect single point mooring (SPM) systems were available for employment with hopper dredging operations in ocean entrance channels. The SPMs would allow hopper dredges to safely moor in offshore waters and to directly pump out dredged material to shore through submerged pipelines. A total of 30 existing projects were identified as being strong potential candidate projects for use of SPM systems in nourishment operations. It is remarked that research is currently being conducted on SPM design within the Corps Dredging Research Program.

Table 7
EXISTING NAVIGATION PROJECTS WHICH USE MAINTENANCE DREDGED MATERIAL FOR
FOR BEACH FILL, NEARSHORE FEEDER BERMS OR OFFSHORE STABLE MOUNDS

Division & District Offices	Project Name	FY - 86 Volume (1000 CY)	FY - 86 Use	FY - 87 Volume (1000 CY)	FY - 87 Use	FY-88 Volume (1000 CY)	FY-88 Use	Funding Authority
New England Division	Green Harbor, MA			36	FB			LC
	Block Island Harbor, RI			16	B			LC
	Chatham Harbor, MA	117	B					LC
	Cuttyhunk Harbor, MA			9	B			LC
	Hampton Harbor, NH			21	FB			LC
	Newburyport Harbor, MA			156	FB			LC
	Sesuit Harbor, MA					27	B	LC
	Plymouth Harbor, MA					40	B	LC
	Nantucket Harbor, MA					40	FB	LC
North Atlantic Division								
New York Distict	Long Island Intracoastal, NY			150	B	150	B	LC
	East Rockaway Inlet, NY					150	FB	LC
	Fire Island Inlet, NY			420	FB			LC
	Jones Inlet, NY			500	FB			LC
Philadelphia District	Lewes & Rehoboth Canal, DE					20		LC
	Muderkill River, Del			10	B	20		LC
Baltimore District	Claiborne Harbor, MD	30	B					LC
	Rhodes Point to Tylerton, MD					60	B	LC
	Herring Creek, MD			20	B			SPP
	Island Creek, MD			30	B			LC
	St. Patrick Creek			30	B			LC
Norfolk District	Chincoteague Inlet, VA			150	FB	150	FB	LC
	Lynnhaven Inlet, VA			220	B			LC
	Nirginia Inland Waterway					30	B	LC
	Tangier Channels, VA					70	B	LC
	Quinby Crek, VA	90	B					
	Cape Charles City Harbor, VA			200	B			LC
	Thimble Shoals, VA			4,000	MB			LC
	Finney Crek, VA					30	B	LC

Table 7 (Continued)

Division & District Offices	Project Name	FY - 86 Volume (1000 CY)	FY - 86 Use	FY - 87 Volume (1000 CY)	FY - 87 Use	FY-88 Volume (1000 CY)	FY-88 Use	Funding Authority
South Atlantic Division								
Wilmington District	Atlantic Intracoastal Waterway Crossings, NC							
	(a) Lockwoods Folly Inlet	96	B	149	B			LC
	(b) Shallotte Inlet	31	B					LC
	(c) New Topsail Inlet	60	B			151	B	LC
	(d) Masons Inlet			77	B			LC
	(e) Carolina Beach Inlet			139	B	33	B	LC
	Morehead City Harbor, NC	3,913	B					LC
	Masonboro Inlet, NC	1,998	B					SNF
Charleston District	Murrells Inlet, SC					500	B	LC
	Folly River, SC	61	B	45	B	44	B	LC
Jacksonville District	Palm Beach Harbor, FL			135	B			LC
	Bakers Haulover Inlet, FL			45	B			LC
	Atlantic Intercoastal WW, Fl			133	B			LC
	Naples to Gordon Pass, FL	119	B					LC
	Ft. Myers Beach Channel, FL	119	B					LC
	St. Augustine Harbor, FL	152	B					LC
	St. Lucie Inlet, FL					60	B	LC
	Ft. Pierce, FL			30	B			LC
Mobile District	Pensacola Harbor, FL	35	B					LC
	East Pass, FL	182	B	126	B	125	B	LC
	Panama City Harbor, FL	221	B			225	B	LC
	Port St. Joe Harbor, FL	500	B					Sec.145
	Appalachicola Bay, FL	138	B					SNF
	Perdido Pass, Ala	660	B					LC
Lower Miss. River Division								
New Orleans District	Mermentau River, LA			125	B			LC
	Miss. R. Baton Rouge to Gulf	4,540	B	1,190	B			LC
	Miss. R. Ship Channel			3,813	B	2,070	B	LC

Table 7 (Continued)

Division & District Offices	Project Name	FY - 86 Volume (1000 CY)	FY - 86 Use	FY - 87 Volume (1000 CY)	FY - 87 Use	FY-88 Volume (1000 CY)	FY-88 Use	Funding Authority
Southwestern Division								
Galveston District	Galveston Harbor & Ch., TX	3,122	FB			1,000	FB	LC
	Gulf Intracoastal WW, TX							
	(a) Main Channel at FM 457					150	B	LC
	(b) Chnl to Port Mansfield	73	FB			132	B	LC
South Pacific Division								
Los Angeles District	Morro Bay Harbor, CA			400	B			LC
	Santa Barbara Harbor, CA	300	B	225	B	260	B	Sec.111
	Ventura, CA	1,000	B	550	B	800	B	Sec.111
	Channel Island Harbor, CA			2,000	B			Sec.111
	Marina Del Rey, CA			31	B			Sec.111
	Ocean Side Harbor, CA	350	B			257	B	LC
San Francisco District	Moss Landing Harbor, CA			29	B			LC
	Santa Cruz Harbor, CA	197	B	212	B	210	B	SPP
North Pacific Division								
Portland District	Columbia & Lower Willamette River Dr. & Wash (multiple placement sites)	1,700	B	1,200	B	2,500	B	LC
	Columbia R. Dalles-Gov. Island Channel, OR			33	B	B		LC
	Port Orford, OR	3	B	4	B	3	B	LC
	Boat Basin at Gold Beach, OR			24	B	34	B	LC
Seattle District	Lake Crockett, WA			31	B			Sec.145
	Quillayuty River, WA			84	B			Sec.145
Alaska District	Ninilchik Harbor, Alaska	8	B	9	B	7	B	LC
	Nome Harbor, Alaska	7	FB	3	FB	5	FB	LC
North Central Division								
Chicago District	Waukegan Harbor Entr., IL			70	FB			LC

Table 7 (Continued)

Division & District Offices	Project Name	FY - 86 Volume (1000 CY)	FY - 86 Use	FY - 87 Volume (1000 CY)	FY - 87 Use	FY-88 Volume (1000 CY)	FY-88 Use	Funding Authority
North Cental Div (cont.)								
Detroit District	Arcadia, MI	7	B	12	B	7	B	LC
	Big Bay, MI			24	B			LC
	Black River, MI					7	B	LC
	Bolles, MI					13	B	LC
	Grand Haven, MI	129	B	22	B	23	B	Sec.111
	Grand Traverse Bay, MI			11	B			LC
	Harrisville, MI			46	B			Sec.111
	Holland, MI	35	B	19	B	25	B	Sec.111
	Leland, MI	25	B	16	B	17	B	LC
	Little Lake, MI	37	B	26	B	21	B	LC
	Manistee, MI	33	B					LC
	Muskegon, MI					54	B	Sec.111
	New Buffalo, MI					10		SPP
	Ontonagon, MI	142	B	54	B	63	B	LC
	Pentwater, MI	23	B	21	B	16	B	LC
	Port Salinas, MI					35	B	Sec.111
	Sheboygan, WI			24	B			LC
	St. Joseph, MI	15	B			29	B	Sec.111
Buffalo District	West harbor, OH					25	FB	LC
	Cleveland Harbor, OH	27	FB	25	FB	25	FB	LC
	Sandusky Harbor, OH			20	FB			Sec.145
Totals		19,297		17,920		9,723		

TABLE 8

EXISTING NAVIGATION PROJECTS FOR WHICH STUDIES ARE TO PROGRESS OR SCHEDULED TO INVESTIGATE USE OF MAINTENANCE DREDGED MATERIAL FOR BEACH AND/OR PROFILE NOURISHMENT PURPOSES UNDER AUTHORITY OF SECTION 933, WRDA 1986

DIVISION/DISTRICT OFFICES	PROJECT NAME
North Atlantic Division	
Philadelphia District	Delaware River Comprehensive Navigation Study
South Atlantic Division	
Wilmington District	Wilmington Harbor, NC: (a) Bald Head Island (b) Passing Lane Atlantic Intracoastal Waterway Oregon Inlet
Charleston District	Port Royal, SC Little River Inlet, NC and SC
Savannah District	Brunswick Harbor, GA (Glynn County Beaches)
Jacksonville District	Fernandina Harbor, FL IWW Nassau Sound, FL Jacksonville Harbor, FL St. Augustine, FL Fort Pierce Inlet, FL IWW Crossroads (St. Lucie) Gordon Pass, FL Fort Myers Harbor, FL Charlotte Harbor, FL New Pass, FL Longboat Pass, FL Tampa Harbor, FL
Mobile District	Pensacola Harbor, FL Panama City Harbor, FL
South Pacific Division	
San Francisco District	Humbolt Harbor Bar and Entrance Channel

The number of projects within each of the categories discussed above and the related Corps district and division offices involved in this study are listed in Table 9.

COMPARISON OF PAST AND PRESENT USES

Some conclusions can be drawn on changes that have ensued in the subject use of dredged material since the late 1970's by comparing findings reported in the referenced prior study and the data obtained during this investigation. The prior study, evaluating the period 1978-1980, examined a total of 211 navigation projects of which 52 projects or 25 percent, in some fashion, utilized material for nourishment purposes. Types of uses were found to be about equally divided between direct beach fill and feeder berms for profile nourishment. In the late 1970's the average annual placement of maintenance material amounted to about 12.5 million cubic yards or 4.3 percent of the total average annual maintenance dredging quantities of approximately 291 million cubic yards. Only nine projects or 17 percent of the nourishment projects surveyed in the prior study required non-Federal cost sharing in the nourishment placement operation.

By comparison to the period referenced above, the data for the 1986-1988 period, involving an examination of 348 navigation projects, found that 152 projects or 44 percent involved the subject use of dredged material. It is remarked that many of these projects are large in areal extent and only a small fraction of the total quantity of dredged material was used for nourishment purposes because the various dredging zones were far removed from beaches and/or much of the material was not suitable for nourishment purposes. This becomes quite evident on considering that the total average annual quantity of maintenance dredging for the 1986-1988 period amounted to 317 million cubic yards of which an annual average amount of only 15.6 million cubic yards or 4.9 percent was used for nourishment purposes. In comparison to the 1978-1980 period, this does not represent a large relative change (+0.7%) as regards nourishment placements relative to overall national dredging quantities. There will, of course, be a net improvement in overall dredged material utilization with implementation of Section 933 projects as they are brought to fruition as well as through future demands. However, it is not anticipated that there will be very large future increases in the overall percentage of maintenance material used for nourishment purposes since, as previously mentioned, the preponderance of dredged material generated in the coastal and Great Lakes regions is removed too far from beach areas for economical application and/or is not suitable for nourishment purposes because of its fine textured physical characteristics. Accordingly, at a national level, the quantity of material used annually for nourishment purposes compared to the total annual quantity being dredged serves as a poor index for measuring the Corps' performance in exploiting this beneficial use of the material. This is apparent in the comparison of project uses reported in the prior and current studies which differ by only 0.7 of

TABLE 9

ACTUAL OR POTENTIAL PROJECTS WITH
NUMBER OF DREDGED MATERIAL PLACEMENTS
FOR BEACH NOURISHMENT AND/OR EROSION CONTROL
PERIOD 1986-1988

	NUMBER OF PROJECTS BY CATEGORY			
PROJECT OFFICE	(A) PLANNING OR UNDER CONSTRUCT	(B) MAINTENANCE MATERIAL PLACEMENTS	(C) SECTION 933 STUDIES	TOTAL PROJECTS
New England Division	1	9	0	10
North Atlantic Division				
New York District	2	4	0	6
Philadelphia District	5	2	1	8
Baltimore District	0	5	0	5
Norfolk District	3	8	9	20
South Atlantic Division				
Wilmington District	1	8	4	13
Charleston District	0	2	2	4
Savannah District	1	0	1	2
Jacksonville District	2	8	12	22
Mobile District	3	6	2	11
Lower Miss. River Division				
New Orleans District	0	3	0	3
Southwest Division				
Galveston District	3	2	0	5
South Pacific Division				
Los Angeles District	0	6	0	6
San Francisco District	0	2	1	3
North Pacific Division				
Portland District	0	4	0	4
Seattle District	0	2	0	2
Alaska District	0	2	0	2
Pacific Ocean Division	0	0	0	0
North Central Division				
Chicago District	0	1	0	1
Detroit District	1	18	0	19
Buffalo District	3	3	0	6
TOTAL	25	95	32	152

a percentage point in the relative amounts of material used while there was a threefold increase (52 to 152) in the number of project applications of beach nourishment and erosion control uses during the later period. In the use of maintenance material alone, substantial increases in applications were made in the late 80s as compared to the late 70s. That is, while average annual maintenance dredging between the 70s and 80s increased by only 9 percent (291 to 317 million cubic yards), the amount of maintenance material placed for beach nourishment increased by approximately 25 percent (12.5 to 15.6 million cubic yards). In this connection, 13 of the 21 field operating activities having direct project management responsibilities for dredging navigation projects in the coastal and Great Lakes regions reported nourishment placements of maintenance material in the period 1978-1980 whereas 19 of these offices reported such placement operations in the 1986-1988 period. Also, significant difference in the findings of the prior and current studies lies in the mix of specific material uses. The prior study found that there were equal uses of direct beach fill and feeder berms for nearshore profile nourishment. This latest investigation recorded 168 separate placement operations for which specific uses were identified. Within that set of operations, 81 percent involved direct beach fill placement, 17 percent placed nearshore feeder berms and 2 percent developed offshore stable mounds. Another notable difference in the findings of the two studies exists with respect to non-Federal cost sharing. Only 17 percent of the actual or potential nourishment applications previously studied required non-Federal contributions for the placement operations. In the latest investigation there are 152 projects involving actual or potential placement of dredged material for beach nourishment or erosion control, and 67 of these projects or 44 percent require non-Federal cost sharing. It is remarked that 25 of these projects require non-Federal cost sharing in their initial construction even though in 13 of those cases the new work material is being placed for erosion control purposes as a least cost disposal alternative. In those 13 cases, future placements of maintenance material for nourishment purposes will not require non-Federal cost participation.

V. EXPLOITING AND PROMOTING OPPORTUNITIES

GENERAL

The Corps of Engineers has actively pursued the beneficial use of dredged material for beach nourishment and/or erosion control in those cases where placement of the material has constituted the least costly means of dredged material disposal or when such placement has an equivalent cost to an alternative least cost disposal method. This is evidenced by the data compiled for the 1986-1988 period in which there were 143 nourishment placements of material dredged in the maintenance of navigation projects. Of these, 123 placements or 86 percent of the total number were conducted as the least costly or equivalent least cost means of disposal. Also, the nourishment placements associated with new work dredging projects currently being considered or under construction are, in the largest proportion, least cost disposal operations. However, a significant number (32) of studies are presently being conducted to determine the feasibility of using dredged material for nourishment purposes under the authority of Section 933, WRDA 1986. With continuing erosion problems, large population growth in the coastal zone and potential intensification of erosive conditions due to future increased rates of sea level rise, it is reasonable to expect expanding interest by state and local entities in the application of Section 933, WRDA 1986.

Timely responses to erosion problems under Section 933, require advanced knowledge, coordination and preparation by all involved parties, particularly the Corps and states, as regards: (a) potential placement sites locations; (b) schedules of future dredging operations; (c) quantities of suitable material that will be available, and estimated costs of placement. This information, in various levels of detail, is available in the Corps headquarters, division and district offices, but generally is not synthesized or compiled in a readily usable format.

POTENTIAL COORDINATION PROBLEMS

During this investigation, division and district personnel were queried on methods used to coordinate Section 933 activities with the respective state agencies. Most responses, with exceptions noted below, revealed that such coordination was conducted informally and on an ad hoc basis. In this connection, the most frequent potential problem that was identified by Corps field personnel concerned possible difficulties in phasing non-Federal budget allocations with the dredging schedules. Indeed, Section 35, WRDA 1988 is directed at minimizing this particular problem by requiring the Secretary of the Army through the Corps to give consideration to state schedules for providing funds for placing sand on beaches and to accommodate such schedules to the maximum extent practicable.

PROCEDURES IN JACKSONVILLE AND MOBILE DISTRICTS

The exceptions alluded to above with respect to coordination practices pertain to official and systematized procedures that have been instituted by the Corps' Jacksonville and Mobile Districts to coordinate Section 933 activities with the State of Florida. These procedures involve furnishing the State the projected 5-year dredging programs of each of these two districts. The programs identify: the projects to be dredged; scheduled dates of dredging; which projects have suitable and unsuitable material for nourishment purposes; which projects involve beach placement as a least cost disposal method; and those projects which would require non-Federal funding under Section 933. Estimated material quantities and added costs for beach placement are also provided for those projects which have Section 933 potential. The 5-year programs and accompanying estimates of material quantities and costs are updated annually. Examples of programs and related information prepared by the Jacksonville and Mobile Districts, and furnished to the State of Florida are presented in Tables 10 to 13.

The procedures established by the Jacksonville and Mobile Districts have been very effective in coordinating Section 933 activities with the State of Florida. Similar coordination procedures established between all Corps operating offices and other states in the coastal and Great Lakes regions would be desirable in the interest of fostering the Corps' dredging policy and in demonstrating an affirmative action in compliance with Section 35, WRDA 1988. Part of this procedure should be the designation of a single point of contact, within the respective Corps field offices, given the responsibility to coordinate this procedure with the appropriate state offices.

LONG TERM MANAGEMENT STRATEGIES

The suggested broad application of coordinating procedures and resulting annual responses of the respective state governments would establish a consistent approach to this particular aspect of the Corps dredging activities. This would be consonant with and supportive of recent Corps initiatives directed at developing a nationwide systems approach to dredging and dredged material disposal vis-a-vis diminishing capacities of existing disposal areas and difficulties in acquiring new cost-efficient sites. Specifically, the Corps has initiated development of a Long-Term Management Strategies (LTMS) program for navigation projects aimed at establishing dredging and dredged material disposal management practices over time periods of 10 to 50 years, depending on project circumstances. The LTMSs may be developed, as required, for single navigation projects or groups of projects on a regional basis. The LTMS procedure involves an examination of all reasonable management options, including

both structural and non-structural alternatives. For example, a structural management option to reduce dredging volumes might involve construction of channel training structures, whereas a non-structural measure could be a beneficial use of dredged material such as beach nourishment. As the LTMS initiative progresses, it is possible that a number of beach nourishment and erosion control placement operations, which are not economically feasible under present conditions, will be identified as feasible disposal plans with the emergence of expected future conditions.

BENEFICIAL USES DATA FILE

At present, there is no data set within the Corps' Civil Works Information System (CWIS) pertaining to beneficial uses of material dredged from Federally authorized navigation projects. Such a data set could easily be developed and maintained to provide essential information for programmatic oversight and for purposes of budgetary justification, particularly as regards cost-sharing in Section 933 activities. Accordingly, a CWIS data file should be established and maintained for all planned and implemented beneficial uses of dredged material in appropriate categories. With respect to beach nourishment and/or erosion control uses, the file should include: (a) the district/division offices; (b) the name of the navigation project; (c) the name of the affected beach area; (d) the type of placement, i.e., beach fill, nearshore berm or offshore mound; (e) the quantity placed; (f) anticipated or actual date of placement; (g) the placement authority; (h) the added cost of placement; and (i) the respective Federal and non-Federal shares of the added costs.

TABLE 10
U.S. ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT
FIVE-YEAR DREDGING PROGRAM

MAINTENANCE (Deep Water Ports)	FY 88	FY 89	FY 90	FY91	FY92
Canaveral					
Entrance Channel	X(e)	X(e)	X(e)	X(e)	X(e)
Turning Basin			X(e)		
Charlotte Harbor	X(a)		X(a)		
Fernandina Harbor		X(b-c)	X(b-c)	X(b-c)	X(b-c)
Jacksonville Harbor					
Bar & Pilot Town Cuts			X(c)		
Mayport to Blount Island				X(d)	
Blount Island to Terminal Channel	X(e)				X(e)
Miami Harbor & River			X		
Palm Beach Harbor	X(c)	X(c)	X(c)	X(c)	X(c)
Port Everglades			X(a)		
Tampa Harbor					
Upper Channels	X(e)				X(e)
Hillsboro Bay Channel & Alafia River			X(e)		
Egmont, Gadsden, Cut C				X(a)	
MAINTENANCE (Shallow Draft Harbors & Waterways)					
AIWW				X(b-d-e)	
Anclote River			X(e)		
Fort Myers Beach				X(c-e)	
Fort Pierce Harbor	X(c)	X(c)	X(c)	X(c)	X(c)
Horshoe Cove			X		
IWW, CR to AR			X(c)		
IWW, Jax to Miami	X(c)	X(c-d)	X(c-d-e)	X	X(c-d-e)
Johns Pass		X(c)			
Longboat Pass		X(c)			
Naples to Gordon Pass				X(c)	
New Pass		X(c)			X(c)
Ponce de Leon Inlet		X(c)			X(c)
St. Lucie Inlet	X(c)			X(c)	
St. Augustine			X(b)		
Okeechobee Waterway		X(c)			
MAINTENANCE FOR OTHERS					
Canaveral					
U.S. Navy Trident	X(d-e)		X(d-e)		X(d-e)
Fernandina Harbor					
Kings Bay Entrance Channel					
U.S. Navy		X(f)	X(f)	X(f)	X(f)
Mayport Naval Station		X(e)		X(e)	

TABLE 11
U.S. ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT
FIVE-YEAR DREDGING PROGRAM

NEW WORK - NAVIGATION	FY 88	FY 89	FY 90	FY 91	FY 92
Canaveral Harbor					X
Cedar Island					
Keaton Beach		X			
Fernandina Harbor					
Kings Bay Entrance Channel					
U.S. Navy					
Beach Disposal	X				
Ocean Disposal	X				
Nearshore Disposal	X				
Fort Pierce Harbor			X(g)		
Jax Harbor Mill Cove	X				
Manatee Harbor			X(e)		
Miami Harbor Channel				X(e)	
Miami River					X(e)
Tampa, Port Sutton			X(e)		
NEW WORK - BEACH EROSION CONTROL					
Dade County Beach Nourishment					
Sunny Isles	X				
Pinellas County Beach Nourishment					
Sand Key # 1	X				
Sand Key # 2		X			
Sand Key #3				X	
Bal Harbor Beach Nourishment		X			
Sarasota County Beach Nourishment			X		
Indian River County Beach Nourishment		X			
St. Johns County Beach Nourishment			X		
Manatee County Beach Nourishment			X		

(a) Maintenance material suitable for beach scheduled for disposal offshore unless additional cost funded by local sponsor/state.

(b) Maintenance material suitable for beach scheduled for disposal in nearshore unless additional cost funded by local sponsor/state.

(c) Maintenance material scheduled for beach disposal as least cost alternative

(d) Maintenance material suitable for beach scheduled for upland disposal unless additional cost funded by local sponsor/state.

(e) Material not suitable for beach disposal.

(f) Material to be disposed in accordance with 1986 MOU between Navy and State.

(g) Suitable material to be placed on beach and fill deep hole in bay.

TABLE 12
U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FIVE-YEAR DREDGING PROGRAM

MAINTENANCE (Deep Water Ports)	FY 88	FY 89	FY 90	FY 91	FY 92
Panama City	X	X	X		X
Pensacola	X	X	X	X	
Port St. Joe	X		X		
MAINTENANCE (Shallow Draft Harbors & Waterways)					
East Pass (Destin Harbor)	X	X	X	X	X
NEW WORK FOR OTHERS					
Pensacola (Navy)		X	X		

The majority of the disposal will provide beach nourishment/littoral zone placement with the exception of Panama City.

TABLE 13
ESTIMATED QUANTITIES AND COSTS

PROJECT	EST QUANTITY (cy) per dredging event	EST ADDITIONAL COST TO PLACE ON BEACH
JACKSONVILLE DISTRICT		
Charlotte Harbor	250,000	$2,500,000
Fernandina Harbor	200,000	1,400,000
Jacksonville Harbor (Mayport to Blount Is.)	200,000	1,400,000
Port Everglades Harbor	100,000	500,000
Tampa Harbor (Egmont and Cut C)	500,000	4,000,000
AIWW, Fernandina to St. Johns R.	100,000	1,000,000
IWW, Jax. to Miami	300,000	3,000,000
St. Augustine Harbor	150,000	900,000
Canaveral Trident Basin (Navy)	100,000	500,000
MOBILE DISTRICT		
Panama City	150,000	525,000

REFERENCES

[1] Responding to Changes in Seal Level - Engineering Implications, Committee on Engineering Implications of Changes in Relative Mean Sea Level, Marine Board, National Research Council, National Academy Press, Washington, D.C. 1987.

[2] NCRI News Vol.3, No.2, National Coastal Resources Research and Development Institute, Newport, Oregon, September 1988.

[3] Government Estimates and Hired Labor Estimates for Dredging, Engineer Regulation No.1110-2-1300.

[4] Hopper Dredge Operating Characteristics, Water Resources Support Center, 29 November 1985.

[5] Beach Nourishment with Dredged Material, Institute for Water Resources, U.S. Army Corps of Engineers, December 1981.

APPENDIX A

CORPS OF ENGINEERS DISTRICT AND DIVISION OFFICES
AND PERSONNEL PROVIDING INFORMATION USED IN THIS STUDY

APPENDIX A

CORPS OF ENGINEER DISTRICT AND DIVISION OFFICES AND PERSONNEL PROVIDING INFORMATION USED IN THIS STUDY

OFFICE	PERSONNEL
New England Division	J.L. Ignazio and J. Bocchino
North Atlantic Division	T. McBride
New York District	S. Calisi
Philadelphia District	B. Leatherman and J. Gebert
Baltimore District	K. Mainquist
Norfolk District	R. Culpepper and R. Vann
South Atlantic Division	B. Holler
Wilmington District	J.T. Jarrett and B. Holliday
Charleston District	D. Harriss and I.B. Kyzer
Savannah District	W.F. Seyle
Jacksonville District	J. Mathews, C. Stevens, J. Hilton R. Bonner, A. Hobbs, B. Farley C. Asten and E. Salem
Mobile District	P. Langan and W. Burdin
Lower Mississippi River Division	T.C. Hill
New Orleans District	J. Wietzel
Southwestern Division	N.E. New
Galveston District	S. Tanner and R. Medina
Pacific Ocean Division	G. Young and S. Boc
South Pacific Division	D. Pirie and G. Domurat
Los Angeles District	--
San Francisco District	--
North Pacific District	J. Schmitt
Portland District	K. Patterson
Seattle District	J. Welsh
Alaska District	A. Shaddock
North Central Division	T. Hempfling
Chicago District	J. Evans
Detroit District	R. Loweke
Buffalo District	P. Berkeley

APPENDIX B

STUDY QUESTIONNAIRE

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF

CECW-R

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Policy Study, "Beach and Nearshore Placement of Material Dredged From Federal Navigation Projects"

1. The purpose of this letter is to request information to assist in conducting the subject policy study being undertaken by the Water Resources Support Center, Institute for Water Resources (CEWRC-IWR), for the Policy, Review, and Initiatives Division, Directorate of Civil Works.

2. A recognized beneficial use of material dredged from Federal navigation projects is its placement on or in the nearshore zone of adjacent beaches to reduce the effects of shore erosion. Public demands and attendant Congressional interest for such applications of dredged material are increasing due to persistent erosional conditions prevalent along many developed reaches of the Nation's coastal, Great Lakes, and estuarial margins. Those who attended the 48th Meeting of the Coastal Engineering Research Board in Savannah, Georgia, 4-6 November 1987, will recall that this issue was one of the focal points of discussion.

3. The objective of the subject policy study is preparation of a report that will document the extent to which the Corps is presently using dredged material for the purpose described above, and will provide reference guidance to field personnel on available choices, in terms of authorities, policies and regulations, for implementing warranted beach or nearshore placement of material dredged from navigation projects. Case studies will be used to illustrate the most appropriate selection of implementation authority or basis that should be used to address particular project circumstances.

4. Your assistance is requested in providing basic information through the attached spreadsheets designated Tables 1-4 (Enclosures 2-5). Instructions are furnished in Enclosure 1. The study information spreadsheets have been designed for ease and minimal effort in completion. Information should be furnished for estuarine, as well as coastal and Great Lakes shorelines.

CECW-R
SUBJECT: Policy Study, "Beach and Nearshore Placement of Material Dredged From Federal Navigation Projects"

5. Since various FOA organizational elements, i.e. Planning, Engineering, and Construction/Operations may be tasked with providing study input, it is requested that a single point of contact at division level, be designated to coordinate district responders and to work with the CEWRC-IWR Study Manager, Mr. Lim Vallianos. The Study Manager should be provided the name, organizational symbol, and telephone number of the point of contact at the earliest convenience. Mr. Vallianos can be reached at:

Water Resources Support Center
Corps of Engineers
Attn: Mr. L. Vallianos
CEWRC-IWR-P - Casey Building
Ft. Belvoir, Virginia 22060-5586
(202) 355-3073

6. It is requested that Tables 1-4 be completed and returned to the Study Manager by 7 November 1988. Your assistance in providing the requested information is appreciated.

FOR THE COMMANDER:

William D. Hegarty, COL, CE

PATRICK J. KELLY
Brigadier General, USA
Director of Civil Works

Encls

DISTRIBUTION:

Commander,
Lower Mississippi Valley Division
Missouri River Division
New England Division
North Atlantic Division
North Central Division
North Pacific Division
Ohio River Division
Pacific Ocean Division
South Atlantic Division
South Pacific Division
Southwestern Division

ENCLOSURE 1

Instructions on Completing Tables 1-4, Policy Study, "Beach and Nearshore Placement of Material Dredged From Federal Navigation Projects"

A. Applicable to All Tables

1. Reproduce Tables 1-4 in any quantity necessary to furnish the requested information.

2. Division and district symbols should be entered on each sheet.

3. A complete set of tables should be returned by each district furnishing information. If there are no projects in the district falling within the category covered by a particular table, "No Projects in This Category" should be typed across the center of the sheet.

4. The quantities of material to be reported pertain only to the amounts placed on beaches or in the nearshore zone in the interest of erosion control. That is, total project dredging may be greater than this quantity.

5. Under the "Use" columns, apply the following abbreviation code (see definitions):

a.	Beach fill	= B
b.	Feeder berm	= FB
c.	Stable mound/for wave energy reduction	= MW
d.	Stable mound/for future beach fill source	= MB

DEFINITIONS:

Feeder Berm — Disposal mounds consisting of beach quality material, i.e. sand or sand/shell mixtures placed in open waters, but sufficiently close to shore so that there is a reasonable expectation that the wave/current regime will disperse the material in an onshore direction so as to furnish the active beach profiles.

Stable Mound — Disposal mounds placed in open waters, generally parallel to the shoreline and in sufficient water depths so as to minimize material dispersion by the wave/current regime. Stable mounds can be developed with dredged material suitable *or* unsuitable for beach fill. In the former case, mounds may be placed for the purpose of attenuating shore-directed wave energy during extreme storm events or alternatively, as a future least-cost source of beach fill with only intermittent and incidental value as a wave filter. In the later case, i.e. mounds consisting of material unsuitable for beach fill, the purpose of the mound is to decrease shore-directed wave energy. In reporting stable mound "use", designate the primary purpose, viz, MW for wave energy reduction and MB as a future source of beach fill.

6. Apply the following code of abbreviations to report the "funding basis or authority" for beach or nearshore placement of dredged material.

a.	Least costly disposal alternative	= LC
b.	Separable navigation project feature	= SNF
c.	Section 145, WRDA 1976 (Tables 2 & 4 only)	= 145
d.	Section 933, WRDA 1986	= 933
e.	Section 111, RHA 1968 (Tables 2 & 4 only)	= 111
f.	Section 904, WRDA 1986	= 904
g.	As part of a shore protection project	= SPP
h.	Other (explain by footnote to table)	= 0

Note: c & d above, Sec. 145, WRDA 1976 was amended by Sec. 933, WRDA 1986
e & f above, Sec. 111, RHA 1968 was amended by Sec. 904, WRDA 1986

B. Table 1 Only

Apply the following code of abbreviations to report the "project status":

1.	Planning	= P
2.	Preconstruction Engineering & Design	= PED
3.	Engineering and Design	= E&D
4.	Under Construction	= UC

C. Table 3 Only

Apply the following code of abbreviations to report "study status":

1.	Under investigation	= UI
2.	Future study planned	= FS

D. Table 4

In submitting candidate projects for case studies, the criteria for selection are:

1. The project should have good documentation in terms of background history, costs, and implementation.

2. Only one candidate for a specific combination of "Use" and "Funding Basis or Authority" should be submitted by any district.

3. Each district should try to submit as many candidate projects as possible which represent different combinations of "Use" and "Funding Basis or Authority".

TABLE 1

NAVIGATION PROJECTS BEING PLANNED, DESIGNED OR UNDER CONSTRUCTION WHICH INCLUDE USE OF DREDGED MATERIAL FOR BEACH FILL, NEARSHORE FEEDER BERMS OR STABLE MOUNDS

DIVISION: _____ DISTRICT: _____

Project Name & State	Project Status	Quantities of Material & Use				Funding Basis or Authority
		New Work		Anticipated Maintenance		
		Volume 1000 C.Y.	Use	Volume 1000 C.Y.	Use	

TABLE 2

EXISTING NAVIGATION PROJECTS WHICH USE MAINTENANCE DREDGED MATERIALS FOR BEACH FILL, NEARSHORE FEEDER BERMS OR OFFSHORE STABLE MOUNDS

DIVISION: _____ DISTRICT: _____

Project Name & State	Material Quantities & Use By Fiscal Years										Funding Basis or Authority
	FY - 84		FY - 85		FY - 86		FY - 87		FY - 88		
	Volume 1000 CY	Use	Volume 1000 CY	Use	Volume 1000 CY	Use	Volume 1000 CY	Use	Volume 1000 CY	Use	

TABLE 3

EXISTING NAVIGATION PROJECTS FOR WHICH STUDIES ARE IN PROGRESS OR WILL SOON BE UNDERTAKEN TO DETERMINE FEASIBILITY OF BEACH OR NEARSHORE PLACEMENT OF DREDGED MATERIAL UNDER AUTHORITY OF SECTION 933, WRDA 1986

DIVISION: _____ DISTRICT: _____

Project Name & State	Study Status	Material Quantities 1000 C.Y.

TABLE 4

CANDIDATE CASE STUDIES OF NAVIGATION PROJECTS THAT ILLUSTRATE HOW DREDGED MATERIAL HAS BEEN OR WILL BE USEFULLY APPLIED AS BEACH FILL, FEEDER BERMS OR STABLE MOUNDS

DIVISION: _____ DISTRICT: _____

Project Name & State	Use	Funding Basis or Authority